

Reijonen, Satu

**Doctoral Thesis**

## Green and Fragile: A Study on Markets and the Natural Environment

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Satu Reijonen

# Green and Fragile

A Study on Markets and the Natural Environment

Green and Fragile – A Study on Markets  
and the Natural Environment

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3.1.2008 Copenhagen  
Satu Reijonen



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# 1. INTRODUCTION

Environmental issues such as climate change, water, soil and air pollution, chemicalization, desertification, and acidification have been discussed vividly over the past thirty years. If the international political agenda is any proof of this, and I consider it to be a good one, environmental issues are considered to be deeply problematic and are seen as potentially detrimental to the well-fare of human kind as well the rest of the planet Earth.<sup>1</sup> While the 1970s and the 1980s were the time of debating the existence of environmental problems, the 1990s brought about a focus on solutions to many previously contested problems. From the 1990s onwards, several international and regional agreements and protocols have been signed in order to combat different kinds of environmental degradation (Hajer 1995).

The link between economic activities and environmental problems is well established. Already in the 1970s, in the first report of the Club of Rome, *The Limits to Growth*, the environmental degradation was attributed to economic growth. In the Brundtland Report in 1987, the reasons behind the increasing ecological problems were seen to be both the present use of natural resources in the western economies as well as poverty in the third world. From the World Summit on Environment and Development in 1992 onwards, sustainable consumption and production patterns have been the focus of various policy measures within the UN regime as well as elsewhere. For example, the UN Commission on Sustainable Development adopted an International Work Programme on Changing Consumption and Production Patterns (United Nations 1995) in 1995, a 10-Year framework of programmes on sustainable consumption and production patterns was launched in the World Summit on Sustainable Development 2002, and the EU started a process on Integrated Product Policy in 1998.

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<sup>1</sup> See i.e. *Our Common Future* (Brundtland 1987), *Agenda 21* (United Nations 1992) the Kyoto protocol (United Nations 1998), *The Johannesburg Declaration on Sustainable Development* (United Nations 2002) and reports such as the *Stern Review on the Economics of Climate Change* (Stern 2006).

The binary concept of sustainable production and consumption employed in these policy processes highlights the interconnectedness of production and consumption patterns: there cannot be sustainability of the one without the other. In this dissertation, the focus will be on environmentally sustainable production and consumption. A key figure in the concept of sustainable production and consumption is the product or service through which it is possible to simultaneously approach the practices of production and supply as well as use and disposal. The producer enterprise is given a great role in making the chain of practices environmentally sustainable: it is through the design of services or products that most of the environmental aspects related to both production and consumption can be enabled and controlled. On the other hand, the role of consumers cannot be underplayed either: without them products will not be bought and used in environmentally friendly ways (see i.e. Green Paper on Integrated Product Policy, Commission of the European Communities, 7.2.2001). In today's world, most of the products travel from producers to customers through market exchange. Therefore, sustainable production and consumption is also essentially about sustainability of markets and business.

In the business and management research, a relevant emerging field of studies, which I call the greening of business research, has evolved to address issues in the interface between the natural environment and business. Scholarly interest has spread into different themes, such as integrating natural environmental issues into the strategies of the firms, the greening of marketing management and the green consumers. In the following, I will briefly present these three different streams of the greening of business literature. I will show what is included in this research, but also point out what is lacking or is in need of further elaboration. In particular, I will argue that there is surprisingly little attention on the role of the product in the greening of business literature. I will conclude the chapter by presenting my research question, purpose and outline of the thesis.

## 1.1. Greening of the firm

Over the recent years, a growing body of literature dealing with greening of enterprises has emerged in the field of organization and management studies. I distinguish between two main themes in this literature: different strategies or

orientations in the greening of the firm and identification of drivers, barriers and determinants of greening of the firm. Research on these two themes will be discussed in the following.

The natural environmental approach of the firm – its policies, value and integration of environmental concerns into its practices – has been the topic of a number of typologizations. The typologization provided by Hart (1995) is one of the most used and best known. Hart (1995) identifies three interconnected strategies for greening of the firm: pollution prevention (reducing emissions of production), product stewardship (minimizing the environmental impacts of the product) and sustainable development (creating future market potential through new technologies and competencies in a world where environmental issues become increasingly significant) (Hart 1995: 996). These strategies form an almost evolutionary order; Hart suggests that acquiring the capabilities needed in different strategies is a process where becoming more environmentally friendly builds up and adds to previously acquired capabilities. For instance, progress in product stewardship requires having a pollution prevention strategy (Hart 1995: 1004-5). In relation to different environmental strategies, Winn and Angell (2000) propose that interaction between two dimensions, corporate environmental policy commitment and implementation, determine how the firm's environmental responsiveness moves between reactivity and proactivity in terms of environmental issues (Winn and Angell 2000: 1129). Henriques and Sadorsky (1999), Aragón-Correa and Sharma (2003) and Buysse and Verbeke (2003) bring in yet another dimension: being proactive versus being reactive in relation to environmental regulations and stakeholder pressure.<sup>2</sup> Starik and Rands (1995) indicate that the sustainability of an organization can be seen in its relationship to many different levels and systems such as the ecological level, the individual level, the organizational level, the political-economical level and the socio-cultural level (Starik and Rands 1995: 916).

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<sup>2</sup> Aragón-Correa and Sharma (2003) and Buysse and Verbeke (2003) indicate that a reactive posture is equal to end-of-pipe pollution control as a reaction to stakeholder pressures, whereas a proactive posture is equal to designing or altering operations, processes and products to prevent negative environmental impacts ahead of stakeholder interests (Aragon-Correa, Sharma 2003: 73, Buysse, Verbeke 2003: 454). This understanding of the relationship between environmental proactiveness and stakeholder relation seems rather insensitive to different situations. An example could for instance be a situation where no regulations or norms on pollution prevention exist. Here a firm can implement emission reduction measures ahead of the regulatory curve. Thus, it is possible for a firm to be both proactive in relation to stakeholder pressure and re-active in terms of environmental measures and vice versa.

In most of the management and organization literature, environmental friendliness of products is explicitly articulated as part of particular types of natural environmental strategies of the firm. The environmental strategy of a firm can include product stewardship and eco-design components (Aragon-Correa and Sharma 2003: 74, Hart 1995: 1001, Shrivastava 1995a, Shrivastava 1995b). Furthermore, greening production is also seen as an integral part of greening products (Aragon-Correa and Sharma 2003: 74, Hart 1995: 1001-05, Judge and Douglas 1998: 244, Shrivastava 1995a, Shrivastava 1995b). According to Shrivastava (1995a, 1995b) and Shrivastava and Hart (1995) for instance, greening of the firm can be achieved by total quality environmental management which integrates life-cycle analysis to the optimization of the ecological performance of the firm (Shrivastava 1995a: 187-88, 1995b: 944, Shrivastava and Hart 1995: 157).

Besides the different types of strategies adopted by enterprises, researchers in management and organization studies have been interested in why these strategies are adopted in the first place. Furthermore, many scholars have formulated often normatively based arguments for why enterprises should adopt a more environmentally ambitious orientation (i.e. Shrivastava and Hart 1995, Starik and Rands 1995: 911). Antecedents, drivers, constituents and motivations for adoption have included both organization related internal benefits or pressures and external pressures and opportunities. In the literature, the following issues are suggested to either motivate or shape the firm's environmental orientation and strategy:

- Competitive advantage benefits
- Legislative pressures and opportunities
- Responsiveness to other stakeholders
- Individual commitment – especially top management commitment
- Managers' emotional perception of environmental issues
- The salience and weight of the environmental issues related to the business area
- The cohesions of networks of firms in the same industry
- The characteristics of the general business environment

In the following I will briefly go through these different arguments. By adopting a proactive environmental strategy, a corporation can strengthen its competitive advantage. Several sources for this are mentioned in the literature. Firstly, an environmental strategy can lead to reduction of operation costs (Banerjee et al.

2003: 109, Hart 1995: 992-993, Shrivastava 1995a: 195, Shrivastava 1995b: 955). Secondly, an enhanced environmental orientation can strengthen supplier ties as cooperation is needed in order to carry out environmental improvements and it can support quality improvement in production (Shrivastava 1995a: 195). Thirdly, it can create further revenues by enabling entry to markets for environmentally friendly products and by reaching out to the segment of green buyers, it can attract new customers to the firm (Banerjee et al. 2003: 109, Shrivastava 1995a: 195, 198, Shrivastava 1995b: 955). Furthermore, it can enable creation of new product markets and expand the total demand of products of the firm by altering the consumer demand (Banerjee et al. 2003: 109, Porter and van der Linde 1996: 127, Shrivastava 1995a: 198). Fourthly, a proactive environmental strategy enables a creation of unique and inimitable strategies and image (Hart 1995: 996, Shrivastava 1995a: 195-196, Shrivastava 1995b: 955). According to Hart's seminal work from 1995, an environmentally proactive strategy creates rare, tacit and complex resources and capabilities in a firm and leads to competitive advantage in a world where environmental issues are becoming increasingly significant (Hart 1995: 998-999).

According to Banerjee et al. (2003), prospects of competitive advantages have, indeed, influenced the development of corporate environmental marketing strategies, including development of eco-friendly products. Some empirical evidence has been used in the discussion about whether a proactive environmental strategy leads to competitive advantage. Based on empirical work, Hart and Ahuja (1996) suggest a positive relationship between pollution abatement and operating and financial performance of the firm, especially for firms with high emission levels (Hart and Ahuja 1996: 34-36). Similar results are provided by Judge and Douglas (1998) and Sharma and Vredenburg (1998) who indicate that proactive environmental strategies and integration of environmental management concerns in the strategic planning process of a firm is positively related to the economic performance of the firm. Dowell et al. (2000) show that multinational corporations aiming for stricter corporate environmental performance than host country standards have higher market values than others (Dowell et al. 2000: 1071). Furthermore, Klassen and Whybark report significantly better manufacturing performance in those plants where environmental technology portfolio was increasingly allocated toward pollution prevention technologies (Klassen and Whybark 1999: 613). Christmann, however, notes that environmental best practices in production do not necessarily lead to cost advantages unless

complementary assets in the form of capabilities for process innovation and implementation are in place (Christmann 2000: 675). Also Aragón-Correa and Rubio-López (2007), raise a critical voice suggesting that whether improvements in the firm's environmental performance also lead to improvements in its financial performance – or reputational performance – is not necessarily a question of a one-solution-fits-all situation. Rather, they suggest, firms should analyse their contingencies and create dynamic capabilities for environmental management (Aragón-Correa and Rubio-López 2007: 358, 375).

Besides the competitive advantage that the proactive environmental strategy is anticipated to provide, this orientation is also suggested to save the firm from trouble with legislators. Implementation of this type of strategy leads to a reduction of liabilities through environmental risk management (Shrivastava 1995a: 195, Shrivastava 1995b: 955). A proactive stance can enable the firm to shape environmental regulations and standards as consistent with their own policies (Buysse and Verbeke 2003: 468, Hart 1995: 995, Puller 2006: 702, Shrivastava 1995a: 196, Shrivastava 1995b: 955). An example of this is given by Child and Tsai (2005), who show how multinational corporations participate in institutional development as change agents by attempting to strengthen and change the local standards to their own benefit in developing countries (Child and Tsai 2005: 116-17).<sup>3</sup> In their article, also Orsato et al. (2002) show how firms influence the content of emerging legislation through industry cooperation.

On the other hand, legislation has also been mentioned as a major driver for integrating environmental concerns in the firm's strategy.<sup>4</sup> According to investigations conducted by Banerjee et al. (2003), regulatory forces do indeed influence the type of corporate environmentalism carried out in firms, especially

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<sup>3</sup> It is not necessarily only the front runners that attempt and succeed in affecting the shaping of regulation and other standards. For example, Orsato et al. (2002) investigate a political struggle on alternative strategies dealing with automobile recycling in some European countries. In their article, they show how the automobile industry engages in affecting the emerging institutional constraints and thereby participates in defining the scope of isomorphic pressures successively integrated in state regulation – and not always in a most proactive manner (Orsato et al. 2002: 661). Furthermore, Lyon and Maxwell propose that high performing firms might deliberately want to keep the regulation level down in order to enable product and price differentiation. According to Lyon and Maxwell, firms can try to pre-empt governmental regulation by self-regulation (Lyon and Maxwell 1999: 191-94).

<sup>4</sup> There is a significant body of literature in the realm of political science, law and environmental economics investigating the effect of legislation and regulation on corporate greening. This dissertation, however, focuses on business related literature and does thus not discuss this literature.



when mediated through top level management (Banerjee et al. 2003: 118). Based on their survey investigation of Belgian firms, Buysse and Verbeke (2003), however, suggest that responsiveness to government regulation is insufficient to push firms to move beyond pollution prevention to product stewardship. Firms that adopt environmental leadership strategies do this not because of governmental regulation (Buysse and Verbeke 2003: 468). Tenbrunsel et al. (2000) suggest that standards such as emission levels set by environmental protection agencies lead to standard conformity rather than more ambitious environmental protection efforts (Tenbrunsel 2000: 862).

Furthermore, strict environmental legislation is sometimes suggested to lead to competitive advantage. One of the most influential contributions in this respect has been the work of Porter and van der Linde (1996) who advocate that particular types of environmental regulation enhances innovation and competitiveness (Porter and van der Linde 1996). Differing perspectives on how environmental legislation affects the economic performance of the firm have, however, been presented in the literature (for a review of these see i.e. Rugman and Verbeke 1998). Nehrt (1998) proposes that firms coming from strictly regulated environments might benefit from first mover benefits when these firms move to operate in other legislative regimes – but not in all kinds of regimes (Nehrt 1998: 88).

Besides legislative actors, pressure from other stakeholders is also suggested to contribute to the corporate approach to the environment (Bansal and Roth 2000: 718). Buysse and Verbeke (2003) and Henriques and Sadorsky (1999) suggest that the importance attached to the stakeholders by the firm, including customers and legislation, is indicative for its engagement in environmental friendliness (Buysse and Verbeke 2003 p. 460-61, Henriques and Sadorsky 1999: 95 ). Besides driving the development of firm's environmental strategy, external stakeholders have also been perceived as significant for realizing these strategies. According to Hart, especially proactive environmental strategies such as product stewardship and sustainable development strategies require extensive stakeholder integration in order to become credible and obtain legitimacy (Hart 1995: 1001-02) and to alter socio-technical systems in order to favour their product innovations (Hart 1995: 1003-04). In contradiction to this, Bansal and Roth 2000, emphasize that to seek legitimacy from either regulatory forces or other stakeholders is very much a risk management strategy. Allowing for stakeholder influence is thus related to

avoiding negative consequences of non-compliance with regulative or other norms, for example avoiding bad publicity (Bansal and Roth 2000: 727-28).

Stakeholders can be fellow firms. Child and Tsai (2005) show how the environmental strategy of the firm is influenced and co-developed in networks of firms within the same industry. Child and Tsai suggest that isomorphism in terms of environmental strategy of firms emerges not only from the actions of local public institutions, but also from a broader international stakeholder forum and from collective networks of multinational corporations (Child and Tsai 2005: 116-17). Bansal and Roth (2000) indicate that the close connections between competitors, field cohesion as they call it, does not serve to motivate firms to pursue higher levels of ecological responsibility or distinguish themselves as superior to others in environmental terms (Bansal and Roth 2000: 731). On the same note, King and Lennox (2000) suggest that industry self-regulation does not necessarily lead to better environmental performance of its participants (King and Lennox 2000: 709-11).

Banerjee et al. (2003) propose that top management commitment plays a role in relation to the kind of environmental strategy that is adopted in the firm by mediating the effect of stakeholders to the firm (Banerjee et al. 2003: 118). Also Egri and Herman find that the personal values of leaders in environmental product and service organizations were more ecocentric, open to change and self-transcendent than those of managers in other types of organizations (Egri and Herman 2000: 394-95). Fineman (1996) suggests that the commitment of top leadership to environmental issues enables managers to express their interest – and in some cases forces them to show interest that is doomed to remain shallow where there is no interest to begin with. In addition, although from a rather different perspective, Fineman suggests that the emotional meanings attributed by senior managers to greening play a role in the way green pressures are received, developed and culturally incorporated (Fineman 1996: 492-94). Also Aragón-Correa et al. (2004) support the view that executives play a central role in improving the corporate commitment to the environment (Aragón-Correa et al. 2004: 972).

A number of studies have also looked into the impact of the individual action in green championing. Ramus and Steger (2000) conclude that strong signals of organizational and supervisory encouragement positively affected the development

of creative green action (Ramus and Steger 2000: 622). In their model of corporate ecological responsiveness, Bansal and Roth (2000) suggest that besides competitiveness and stakeholder legitimacy also individual environmental commitment motivates the employees to go green (Bansal and Roth 2000: 728). Rothenberg (2007) investigated the strategies of individual environmental managers in managing and framing environmental institutional pressures and mediating and negotiating them in relation to diverse technical pressures, such as production efficiency and product quality. She points out that environmental managers sometimes act like institutional entrepreneurs altering the discourse about environmental performance of the firm (Rothenberg 2007: 754). A similar conclusion is presented by Anderson and Bateman (2000) who observed that individuals championing natural environmental issues in organizations employed particular framing dimensions and presentation styles and used several influence tactics (Andersson and Bateman 2000: 565-66).

Based on empirical data, Banerjee et al. suggest that the environmental impact level of the industry plays a role in whether public concern, regulatory forces or competitive advantage aspirations influence the form of corporate environmental strategies (Banerjee et al. 2003: 109). Furthermore, Bansal and Roth suggest that issue salience, that is the certainty, transparency and emotivity of the environmental question, influenced the motivation of the firm to respond in action (Bansal and Roth 2000: 729). Furthermore, Aragón-Correa and Sharma (2003) hypothesize that the general business environment characteristics, such as uncertainty, complexity and munificence affect the firm's likelihood to develop a proactive corporate environmental strategy and have an impact on how a developed strategy affects the competitive advantage (Aragón-Correa and Sharma 2003: 72-73).

Azzone and Noci (1998) identify different internal and external antecedents for ambitious green strategies: top management commitment, decisional processes that support managers in the identification of benefits and disadvantages associated with radical green innovations, employees' environmental culture, the role of governments in supporting the environmentally aware market segment, regulations and environmental management standards like ISO 14001 (Azzone and Noci 1998: 108-09).

As can be seen in the presentation of the literature above, the environment and management related literature on greening of the firm is inspired by a number of different theoretical perspectives, much of the literature being, however, managerially biased without explicit references to theories. The theories on which the models and concepts build include the resource based view of the firm (RBV) (Aragón-Correa and Sharma 2003, Christman 2000, Hart 1995, Klassen and Whybark 1999, Sharma and Vredenburg 1998), stakeholder theory (Banerjee et. al. 2003, Henriques and Sadorsky 1999), contingency theory (Aragón-Correa and Sharma 2003) and new institutional theory (Child and Tsai 2005, Hoffmann 1999, Orsato et al. 2002, Orssatto and Clegg 1999, Rothenberg 2007), to name some of the most prominent lines of thought. Some of the works combine different theoretical perspectives. For example, Bansal and Roth (2000) employ new institutional theory, resource based view of the firm, stakeholder theory and individual values theory in order to provide a complete model of what influences the corporate environmental orientation. Aragón-Correa and Sharma (2003) combine the natural resource based view of the firm with contingency theory in what they call contingent RBV of the natural environment (Aragón-Correa and Sharma 2003: 72-73).

In the research related to the resource based view of the firm, the focus has been on portraying the environmental strategy as a dynamic capability and resource with the help of which competitive advantage can be obtained. The seminal work in this genre has been Hart's article, "A Natural-Resource-Based View of the Firm", from 1995. Hart's ideas are further developed in the work of Aragón-Correa and Sharma (2003), Buysse and Verbeke (2000) and Judge and Douglas (1998). Stakeholder theory is used by Buysse and Verbeke (2000) and Banerjee et al. (2003) in order to facilitate the investigation of the impacts of different stakeholders on the form of environmental orientation and strategy conducted in the firm. Aragón-Correa and Sharma (2003) employ the ideas of contingency theory to look into how the type and effect of the environmental strategy is dependent on the external business environment of the firm. In the literature relying on new institutionalism, concepts of institutional constraints, isomorphism and legitimacy have been addressed in relation to the interface between an organizational strategy and agency, organizational field and regulation.

To sum up, the questions frequently asked in the greening of the firm literature concern what types of environmental strategies firms develop and employ and

what factors determine or influence the choice of strategy. Often, although not always, the studies feature a rather normative or technicist approach to the question of how to reduce environmental impacts of business.<sup>5</sup> In the past ten years, however, more empirically based research has been conducted on these themes. Even so, though most of the greening of business research is focused on the organizational level, there are hardly any examples of detailed investigations of how firms and organizations become green or environmentally sustainable and what is required in order for this to happen. Exceptions to this includes an article by Georg and Füssel (2000) that emphasizes the emergent processual character of greening of an organization and the role played by sense-making and emotions in this process.

Working mostly in the field level, researchers inspired by new institutionalism have furthermore introduced processual perspectives on the emergence of an environmental strategy and the political nature of the interaction between actors in this process. These scholars study how corporate environmentalism and related regulative, normative and cognitive institutions evolve over time in interactions between different actors, i.e. different firms, industry organizations and government (see i.e. Child and Tsai 2005, Hoffmann 1999, Orsato et al. 2002, Orssatto and Clegg 1999). This research has emphasized the importance of moving beyond the single organization in order to understand the process of the greening of a firm.

Returning to the concept of sustainable production and production, empirical work addressing the product related greening strategies is of special interest. The process of greening of products is not covered in detail in the current research. Rather, greening of the product is – just as the other greening strategies – black-boxed as a process. It is simply referred to as a strategic approach for greening of the firm that can be employed for either moral or competitive reasons (see i.e. Aragon-Correa and Sharma 2003: 74, Hart 1995: 1001, Shrivastava 1995a, Shrivastava 1995b). In this way, the green product also becomes a mere topic of implementation. Yet, for whatever cause the greening of the product might be attempted, it would be beneficial to strengthen the understanding of processes where the product assumes

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<sup>5</sup> For more on critical views on the environment related management studies see critiques presented by Prasad and Elmes (2005) and Starkey and Crane (2003) on the pragmatic and management orientation of the literature and Newton and Harte (1997) and Fineman (1996) on the managerialism and evangelism of the green business literature.

an environmentally friendly form – or where this is attempted in vain. Researchers should here be open to influences stemming from both in- and outside the firm.

A number of studies within the realm of the natural environment related organization and management studies have focused on the interface between environmental sustainability and competitive advantage (i.e. Banerjee et al. 2003, Dowell et al. 2000, Hart and Ahuja 1996, Klassen and Whybark 1999, Porter and van der Linde 1996, Sharma and Vredenburg 1998). While the potential of green products to create a competitive edge for the firm is frequently referred to, this claim has mainly been investigated through indirect investigations such as comparison of the markets or financial performance of green firms with those of non-green firms. In my opinion, this question is worthy of a more detailed empirical inquiry. Furthermore, I would like to propose a related yet wider question: how does environmental friendliness – or lack of it – of a product participate in the construction of markets.

## 1.2. Green marketing

Green marketing has been defined in many different ways. Menon et al. (1999) define it as follows (Menon et al. 1999: 3):

”Environmentally-based marketing programmes refer to corporate policies, practices, and procedures in the realm of marketing that explicitly incorporate an ecologically friendly focus with a goal of creating revenue providing exchanges that satisfy organizational and individual objectives for product and/or product line.”

Peattie (2001b) distinguishes between three different phases in the history of environmental marketing: ecological marketing, environmental marketing and sustainable marketing. He argues that green marketing practices have evolved from reducing dependence of particular products to broader initiatives tapping the green consumer demand. The future form of green marketing, sustainable marketing, he suggests, is a more holistic approach addressing the impacts of products for the future generations, equity among nations, sexes and ages, and emphasis on needs rather than wants (Peattie 2001b: 130-41).

According to Menon et al. (1999), environmental marketing is based on integrating environmental issues to products, marketing places, promotion activities, pricing strategy as well as decisions on which customers to serve (market selection) (Menon et al. 1999: 3). Environmental questions can also be included in the overall positioning of the firm (Polonsky and Rosenberger 2001: 24) or the brand (Wong et al. 1996: 268) and to the firm's stakeholder relations in a form of collaborative green marketing (Mendleson and Polonsky 1995: 6-7, Hartman and Stafford 1997). Collaborative green marketing denotes strategic alliances with stakeholders such as environmental NGO's that can bring positive attention to firm's environmental work and products (Mendleson and Polonsky 1995: 6-7, Hartman and Stafford 1997). Furthermore, the principles of green marketing can steer the use of distribution channels and the creation of new ones (Wong et al. 1996: 279). According to Belz, sustainability marketing comprises of analysis of sustainability problems and consumer behaviour, laying a normative basis for integrating sustainability issues into marketing activities in the form of company guidelines and principles, strategically targeting the customers and positioning the firm and the products with the help of the sustainability dimension, defining a consistent marketing mix and, finally, actively participating in transforming the public and political processes in favour of sustainability (Belz 2006: 140-42).<sup>6</sup>

Most of the green marketing literature approaches green marketing as part and parcel of a corporate environmental strategy. Green marketing is seen as an activity going beyond product promotion through marketing tools. It is a more general market strategy dealing with wider issues such as what kind of products are offered to customers and even how the disposal or take-back of the product is organized (i.e. Menon et. al. 1999, Polonsky 1995, Polonsky and Rosenberger 2001). Since other approaches consider product development, logistics and disposal as separate forms or organizational action, this broad understanding of green marketing might seem confusing. Green marketing scholars, however, make a specific point of including these issues under the umbrella of marketing. The main point that can be drawn from the marketing literature is that in order for the green marketing strategy to be credible and effective, the product portfolio of the firm must undergo a strategic scrutiny from an environmental point of view and the environmental strategies and implementation of these must be acceptable in terms of the whole life-cycle of the product.

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<sup>6</sup> For Belz, sustainability marketing refers to both social and ecological sustainability.

A number of scholars also address the drivers and reasons for companies to employ green marketing strategies and methods. According to Menon et al. (1999) green marketing might have positive impacts on customer response and financial performance of the firm. Green marketing can enhance the brand image, increase levels of customer loyalty, give a favourable image of the corporation and help suppress negative publicity. Furthermore, it might enhance market share and the return on investments (Menon et. al. 1999: 7). Based on their empirical investigations, Baker and Sinkula (2005), indeed, suggest that there is a positive relationship between environmental marketing orientation of the firm and new product success (Baker and Sinkula 2005: 471). Mathur and Mathur (2000), however, indicate that corporate announcement of green marketing activities is not well received by investors, especially when combined with weaker financial performance (Mathur and Mathur 2000: 198-99).

Menon et al. suggest that integration of environmental perspectives into marketing strategies is influenced by customer expectations, the competitive intensity of the industry, market opportunities and environmental orientation of the management of the firm (Menon et. al. 1999, 9). Along the same lines, yet based on empirical investigations, Wong et al. (1996) suggest that consumer pressures and related market opportunities are the most influential factors in decisions to launch greener products in the UK. Firms, however, state that consumer pressure had been slowing down from the early 1990s to the mid 1990s (Wong et al. 1996: 267).

However, even though many scholars celebrate the benefits of green marketing, voices on the failure of this marketing strategy can also be heard in the marketing literature. Crane (2000) and Peattie (2001b) and Peattie and Crane (2005), amongst others, refer to a green marketing boom in the early 1990s and a successive backlash. As green marketing activities were widely perceived as unbeneficial for market development in the late 1990s, Crane identified different strategic responses to marketing. These responses were: passive greening (under pressure from key stakeholders), muted greening (behind-the scenes working on environmental issues), niche greening (targeting a specific environmentally conscious market segment) and collaborative greening (collaboration with stakeholders, i.e. suppliers and environmental NGOs, to achieve environmental improvements) (Crane 2000: 285). Crane (2000) and Peattie (2001b), Peattie and Crane (2005), Reinhardt (1998) and Wiser (1998) suggest several ways of "getting green marketing back on track".



Several reasons for the backlash or otherwise unsuccessful green marketing have been suggested in the literature. These include: lacking customer orientation, using greenness of the product as an additional promotional dimension without changing the product itself, developing the green strategy only until the 'low hanging, cost effective fruits had been harvested', focusing green marketing activities solely on promotion, using activities aiming only at regulatory compliance as marketing arguments, insufficient stakeholder involvement (Peattie and Crane 2005: 360-64), limitations in green product performance (Wong 1996: 279), free-rider problems on the customer side (Wiser and Pickle 1997) and poor credibility of marketing claims, consumer scepticism and confusion (Mendleson and Polonsky 1995: 5, Wong et al. 2001: 273).

Besides the research aimed at identifying different green marketing strategies, ages or reasons for the failure of green marketing in tapping the anticipated customer interest, also effects of particular marketing instruments on the consumer behaviour have been investigated. For example, Sammer and Wüstenhagen suggest that energy labelling has a positive effect in making the energy issue meaningful to people (Sammer and Wüstenhagen 2006: 192). Teisl et al.'s article on dolphin-safe tuna labelling highlights that a dolphin-tuna controversy and subsequent implementation of dolphin-safe labels on tuna affected consumer behaviour (Teisl et al. 2002: 339). The impact of the content and style of advertising or marketing on consumer behaviour has also been a topic of concern. Schuhwerk and Lefkoff-Hagius (2001) suggest that green appeals in advertising are more persuasive than non-green appeals for those less involved with the environment (Schuhwerk and Lefkoff-Hagius 2001: 53). Based on his empirical data, Davis (1993) states that environmental claims that are perceived as specific foster a positive advertiser image and product perception and are significantly more likely to lead to higher level of purchase intent than claims perceived as vague (Davis 1993: 23-5).

Similarly to the greening of the firm literature, green marketing research advancements do not rely on one single theoretical base. Rather, different studies draw on different theoretical approaches, inductive analysis or do not explicate their theoretical basis. Different theories used are stakeholder theory and (Polonsky 1995), resource based view of the firm (Baker and Sinkula 2005) and public goods theory based on neoclassical economics (Wiser and Pickle 1997). Furthermore, a lot of the literature presented above is inspired by main stream marketing thought, often relying on concepts such as marketing mix and product differentiation.

This body of literature is in general characterized by a high degree of managerialism and use of case studies in an illustrative sense. The few empirically based contributions include Crane's (2000) qualitative study on manager perceptions of the backlash in green marketing, Wong, Turner and Stoneman's (1996) qualitative analysis on manager's perceptions on green marketing strategies and market prospects, Baker and Sinkula's (2005) statistical analysis of mail survey results and Mathur and Mathur's (2000) statistical analysis on wealth effects of announcements of green marketing activities. Furthermore, empirical studies have been conducted on the impacts of different marketing tools and claims on customers. Wong et al.'s (1996) and Crane's (2000) work feature reflections on changes in marketing practices over time. In depth case studies on how a green marketing strategy evolves in a particular company over time for a particular product are rare, if they exist at all.

The green marketing literature often points to the two-way influence between the marketing strategy of the firm and the buyer. This is especially clear in literature where the green backlash is addressed (see i.e. Crane 2000, Peattie and Green 2005, Peattie 2001, Wong et al. 1996). Due to the perceived discrepancy between the anticipated interest in green products and the experienced demand, the markets for environmentally friendlier products are not, in principle, taken for granted in the green marketing literature. Some interesting reasons for the discrepancy are brought up, including the role of misleading claims in making customers sceptical and poor product performance on other parameters than the natural environment.

However, despite addressing the discrepancy and interlinkage between supply and demand side actions, most of the green marketing literature does not address or only vaguely refers to the role played by marketing activities in constructing a product as green. How a particular form of environmental friendliness emerges in the course of marketing is not discussed. Furthermore, the customer interest for an environmentally friendly product is often perceived as pre-existing. The success of green marketing is dependent on the clarity and appropriateness of the communication. This can be jeopardized by previous misleading green claims that have made the consumer sceptical. As a result of this, the green consumer is also black boxed. Environmental friendliness as an evolving product quality in interaction between different actors is not investigated.

## 1.3. The green consumer

A substantial amount of research has been conducted on the green consumer, mostly through quantitative methods and through surveys and questionnaires. Prevalent questions feature the green consumer segment size, the identification of the green consumer and understanding the green purchasing situations. Green consumer research often includes a strong linkage to marketing. While the theoretical anchoring in this stream of studies remains largely implicit, managerial implications for developing successful marketing strategies are identified.

Green consumer segmentation has been attempted by different means: socio-demographic definitions such as income, education, gender and age (for review see Straughan and Roberts 1999), psychographic criteria such as environmental concern, environmental consciousness, perceived consumer effectiveness, political orientation and degree of altruism (Roberts 1996, Straughan and Roberts 1999, Schlegelmich et al. 1996). Some research combines different types of principles of segmentation. Examples of this type of research are empirical investigations conducted by Laroche et al. (2001) focusing on demographics, knowledge, values, attitudes and behaviours of the green consumer and Mainieri et al. (1997) focusing on awareness of environmental impacts of products, specific environmental beliefs, general environmental attitudes, demographic variables and pro-environmental behaviours like recycling (Mainieri et al. 1997: 189).

Peattie (2001a), however, proposes that rather than "hunting" a green consumer, understanding of consumer behaviour in particular situations should be the focus of research (Peattie 2001a). Drawing on transaction economics Peattie (2001a) and Meyer (2001) concentrate on situational factors of purchasing rather than consumer segmentation. Peattie (2001a) suggests that the degree of confidence in the environmental benefits and the compromises, like paying a price premium, accepting a lower level of performance or travelling to non-standard distribution outlets, play a role in terms of the likelihood of a purchaser being affected by environmental criteria (Peattie 2001a: 192-93). Based on their empirical findings, McDonald and Oates (2006) show that activities, including green purchasing related activities, were perceived very differently by different people in relation to the compromises that were seen to be linked to these practices and in relation to confidence in the environmental benefits these would bring (McDonald and Oates 2006: 167). Addressing the compromise issue Meyer (2001) focuses on perceived

product costs and benefits as a determinant of green purchasing behaviour. Meyer discusses costs like product price, search cost, information cost, cost of change, cost of usage and cost of disposal as well as benefits like functional benefits, appearance and benefits for the purchaser's self-esteem – and for the marketing strategy of the firm (Meyer 2001: 319-20).

The critical view on the segmentation approach is also supported by Pedersen and Nedergaard (2006) who emphasize the complexity of consumer behaviour: consumers can be green in relation to certain products, at particular times or when they buy for their children, environmental issues are balanced with price, convenience and quality, consumer knowledge on eco-labelling can vary from product type to product type and so forth. According to Pedersen and Nedergaard, conflicts within consumer values, attitudes and basic assumptions, the impossibility to process and use all the information required to make consistent procurement decisions, constraints on individual learning capacity and unintended adverse impacts of individual's buying behaviour make it impossible for a consumer to be consistently green (Pedersen and Nedergaard 2006: 21-24). Peattie's, Meyer's and Pedersen and Nedergaard's points are significant as they reveal an interesting characteristic about the research on the green consumer: in the segment thinking the greenness of the consumer is approached as a capacity of a particular kind of person that consistently folds out in everyday practice. The green consumer is a static entity.<sup>7</sup> Both Peattie and Pedersen and Nedergaard suggest that the implementation of green consumerism is a patchwork contingent on many factors. For Peattie these are situational and relate to the transaction costs of buying green, for Pedersen and Nedergaard the inconsistency of buying green is less rooted in rational cost-benefit thinking than in a group of different attitude-, culture- and learning related inconsistencies and economic constraints.

A number of investigations combine the consumer segment and procurement situation related approaches. Bhate and Lawler (1997) combine demographic, psychological and situational variables in their quest for the green consumer. Based on their empirical work, Bhate and Lawler conclude that innovative consumers are more inclined to buy green products. Furthermore, they show that involvement in environmental issues does not play a significant role whereas

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<sup>7</sup> Here a further question about the performativity of marketing and consumer research could be raised. By creating green consumer profiles, researchers might participate in enacting and constructing particular types of consumers. The performativity of marketing theories is suggested i.e. by Kjellberg and Helgesson (2006 and 2007).

availability of green products does (Bhate and Lawler 1997: 463). Related to Peattie's (2001a) confidence variable, Cleveland et al. (2005) investigate the impact of people's beliefs about their ability to affect the environmental outcomes through their own actions (Cleveland et al. 2005). Based on planned behaviour theory Kalafatis et al. (1999) argue that the desire to act as others expect, confidence in that the person in question can perform the behaviour and beliefs about the outcome of the action are determinants of pro-environmental purchasing behaviour (Kalafatis et al. 1999: 444-45).

While I perceive the critique against the green segment research as basically proper, I would, however, like to highlight an issue that the segmentationists and situationalists – such as Peattie (2001a) and Meyer (2001) – have in common. Both seem to assume that a green consumer does indeed exist; the critics just point out that such a consumer might be torn between different interests (or costs) or not capable of dealing with the complexity of environmental issues in order to act green. I suggest that another approach might be worth investigating, namely *how* a more or less green consumer emerges. Rather than taking a green consumer for given, the development of her characters – more or less environmentally oriented – ought to become a topic of an open inquiry.

Another issue that I wish to point out here relates to the role played by green products in this body of literature. Especially the transaction cost theory inspired scholars refer to the weighing between the cons and benefits of buying a green product, including those benefits and drawbacks related to other product qualities. Poorer performance of green products is often suggested. This question of the relationship between different product qualities in particular procurement situations is worth investigating empirically. Here, I argue that approaching the product qualities as emergent rather than pre-given adds to the sensitivity of the researcher to understand the dynamics of green consumption; the same product might not be enacted as environmentally friendly or having a poorer functionality in all locations. Rather than assuming intrinsic environmental friendliness, it is interesting how a green consumer and a green product take shape and how the greenness of both is possibly enabled.

## 1.4. The product in the centre: the research question

The research on greening of business deals with several relevant issues concerning sustainable production and consumption. It addresses topics such as green strategies of the firm, green competitiveness, green marketing and green consumers. The analytical starting point of the current body of literature has been on consumers or producers and their strategies and behaviour. In this introductory chapter, however, I have suggested that the greening of business literature has black-boxed a significant part in the process of greening of production and consumption, namely the greening of the product. Few, if any, studies have asked how an environmental friendly product is actually brought into existence and how it maintains its environmental friendliness in different market related practices. I suggest that the greening of business research would benefit from studies that address questions such as what kind of work is required to accomplish more or less environmentally friendly products.

In this dissertation, I wish to approach the interface between environment and business – and sustainable consumption and production – through investigating the process where a product assumes more or less environmentally friendly qualities in different market constitutive practices. My research question is as follows:

How is environmental friendliness stabilized and destabilized as a product quality among the market actors?

This thesis focuses on a particular product, a urine bag, and the development of its markets over time. The purpose of this study is to describe and analyse how an environmentally friendly product is brought into existence, how the environment related qualities of the product emerge and how these emerging qualities become a part of – or are rejected from – the way markets are organized. This is done by empirically investigating the work of making and sustaining environmental friendliness as a product quality in different practices relevant to market exchange. It is by staying close to the market practices and looking at what happens to environmental friendliness that we can see how environmental friendliness as a product quality becomes significant in ordering the market exchange – or why the contrary might happen.

Taking the green product as a starting point might provide a valuable contribution to the ongoing discussions in the fields of the greening of the firm, green marketing and green consumers. Product stewardship has already been mentioned as one possible strategy for a firm to go green. In my opinion, inquiring into the making of this strategy would imply taking the greening of the product seriously and investigating how a green product – and thereby the green strategy – emerges. Placing the product in the centre of the research of green marketing can teach us about the role of marketing in mediating between the emerging qualities of the product, both on the customer and on the producer side. Posing the question about how a green product becomes green on the customer sides can help us understand the processes through which the green consumption emerges – or fails to emerge – rather than assuming a static existence of a green consumer.

Besides contributing to the on-going discussions in the field of greening of business, I argue that studies focusing on the product can provide insights into the construction of markets for environmentally friendly products. As already indicated in the very beginning of this chapter, markets as mechanisms that facilitate exchange are closely related to the understanding of the dynamics of consumption and production, sustainable or not. Until now, the greening of business literature has contributed to an understanding of firms and consumers both of whom participate in market exchange. Markets for environmentally friendlier products are usually portrayed as niche markets or markets where a green consumer segment can be identified. At the same time, the inability of green marketing to attract wider audiences is perceived as puzzling – and problematic for the natural environment. I argue that due to the segregated approach to market actors, it has been difficult for the greening of business literature to address issues such as how the markets for environmentally friendlier products emerge. In my opinion, then, there is an urgent need for empirical research that approaches the emergence and development of markets for environmentally friendlier products as something dynamically evolving. Here, I suggest, studying processes where a product becomes more or less green brings together the work done in different locations, whether on the supply or demand side or somewhere else, in order to organize and shape the markets in relation to the natural environment.

I see the contribution of this study to the field of greening of business research as fourfold. First of all, as mentioned above, in-depth empirical studies are rare in the greening of business literature. This dissertation is an empirical, in-depth case

study over time. Secondly, the study breaches over the often separately viewed parties: the public, producers and customers and celebrates their partly interdependent roles in shaping the market. Thereby, this study contributes to understanding of both greening of markets and also greening of products, firms and consumers. Thirdly, this study takes a product as starting point and thus provides a novel analytical perspective for studying the greening of business. Fourthly, this study builds upon a constructivist conceptualization of market processes which has been used in very few studies in the field of greening of business research. Markets – just as product qualities – are approached as emergent and evolving in the interaction between different actors.

## 1.5. Outline of the thesis

In chapter 2, I shortly present my primary theoretical orientation, the constructivist line of thought and the actor-network theory, in relation to market studies. I then discuss the concepts of constructivist market research with a focus on the constructivist understanding of markets and the concepts of qualification (Callon et al. 2002) and coordination (Mol 2002).

In chapter 3, I present my research approach, a single case study, research design and the methods for gathering materials from the field and analyzing them. Furthermore, the implications of the constructivist position to my field work and the presented results are discussed in this chapter.

Chapter 4 is the first empirical chapter of this dissertation. It discusses how environmental friendliness has been enacted in relation to urine bags in the public arena. The environmental concerns in this product group are related to the product material, polyvinyl chloride (PVC). As PVC has been a topic of wider debate reaching well beyond the field of urine bags, this chapter investigates different attempts to shape the use of PVC and its relation to the natural environment in general. Implications of these attempts, whether successful or not, are discussed in relation to making environmental friendliness a product quality in the realm of urine bags.



In chapter 5, I present a study of product development and marketing of a particular urine bag, Conveen Security+. This chapter investigates the stabilization and destabilization of environmental friendliness as a product quality of the urine bag in the course of product development and marketing.

Chapter 6 follows the procurement and product assessment practices for urine bags on the user side. Practices related to choosing urine bags are elaborated in different settings: procurement offices, hospitals, care homes, rehabilitation centres and private homes. This chapter focuses on analyzing the different forms which environmental friendliness assumes and the significance it is granted in different locations and different practices of procurement and use.

In chapter 7, the concluding chapter, I discuss the findings of my analysis and present my conclusions.



## 2. CONSTRUCTIVIST APPROACH TO MARKETS

This study is a constructivist study on the role of environmental friendliness in the markets for urine bags. The constructivist market studies have their origins in science and technology studies (STS) and notably actor-network theory (ANT). ANT inspired studies have in recent years spread to different empirical domains, one of these being market studies. Constructivist market studies have been made in the empirical fields of finances (Beunza et al. 2006, Beunza and Stark 2004, MacKenzie 2003), medicine (Sjögren 2006, Sjögren and Helgesson forthcoming), energy (Garud and Karnøe 2003, Åkerman and Peltola 2005), fishery (Holm and Nielsen 2007), telecommunications (Helgesson 1999), food distribution (Kjellberg 2001, 2007), public sector science services (Law and Akrich 1996) and many others.

What is the take of constructivist market studies on markets? Rather than seeing markets as something natural or static, constructivists approach them as an outcome of an ongoing construction work (see i.e. Callon 1998a: 245, Callon et. al. 2002, Callon and Muniesa 2005). Understanding markets as an outcome is closely related to how ANT approaches the world: the world and its different phenomena is an effect of dynamic associations between heterogeneous actors and their networks. This work of construction and association is situational and as Helgesson et al. (2004) put it, markets are constituted in practices.<sup>8</sup> This implies that markets emerge and change as the practices change. Because of the various different practices and actors participating in these practices, markets may take various different forms. Stable market configurations are possible but acquire continuous maintenance (Callon 1998a: 245). What is interesting from the point of view of constructivist market studies is how these different forms of markets are established and constituted.

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<sup>8</sup> Helgesson et al. identify three broad and interlinked categories of market practice: exchange practice, normalizing practice and representational practice (Helgesson et. al. 2004).

ANT inspired market studies share an interest in the organizing of markets with the many different branches of the sociology of markets (i.e. Coase 1988, Fligstein and Dauter 2007, Swedberg 1994). Fligstein and Dauter (2007) go as far as grouping actor-network studies into the sociology of markets (Fligstein and Dauter 2007: 2). Sociology of markets approaches markets as social structures (i.e. Fligstein and Dauter 2007, Swedberg 1994) – not as a play ground for a rational profit-maximizing man from the neoclassical economic theory. This approach allows for the dynamic and changeable character of markets. What is defined as social, however, is defined in somewhat different terms in ANT and the sociology of markets. Whereas the literature within the sociology of markets has its focus on the human actors, ANT postulates that non-humans, i.e. accountancy models, classifications, economic science and standardizations, also participate in shaping of markets (Callon 1998a and b, 2002, Callon and Muniesa 2005). Furthermore, providing social explanations, that is seeing a phenomena as a result of resource dependency or social norms or institutions, is somewhat foreign to ANT (cf. Latour 2005). Grand explanations are perceived as taking the focus away from the local work of constructing markets as they tend to emphasize the dominance of abstract social mechanisms and powers working at a distance. Furthermore, ANT takes strong opposition to giving any a priori explanations to any phenomena.

ANT market studies share the same ontological and methodological positions familiar to other ANT-studies, anti-essentialism and a principle of generalized symmetry being perhaps the most important of these (these are described in detail in chapter 3). Like the earlier ANT-studies on science and technologies, constructivist market studies often attend to the role of non-humans in co-constructing the world. This can especially be seen in the wide interest in the performativity of economic (and other theories) in markets (on economic theory see Callon 2007, MacKenzie 2006, 2004 and 2003, Holm and Nielsen 2007; on marketing theory see Kjellberg and Helgesson 2007). Furthermore, the role of calculative devices in shaping the market has been in focus in many of these works (Beunza and Garud 2007, Beunza and Stark 2004, Sjögren and Helgesson forthcoming, Tryggestad 2005, Åkerman and Peltola 2005). Entrepreneurship and distributed agency have been dealt with for example by Garud and Karnøe (2003).

## 2.1. Markets as qualification devices

Even though ANT refuses to give a final explanation for markets and denounces the possibility of describing markets in generic terms it still has ways of conceptualizing what markets are in all their diversity. Callon prescribes to an understanding of markets that emphasizes the market as a coordination device for diverging interests where the interest conflicts are resolved by defining a price for a good or service (Callon 1999: 183). According to Callon and Muniesa (Callon and Muniesa 2005: 1245):

”A market can be described (at least partially) as a collective device for the evaluation of goods.”

At the heart of this evaluation lies the process of qualification (Callon et al 2002). Qualification refers to a process where a good gradually acquires properties which emerge in a constant alignment of the markets actors’ interests while simultaneously shaping these. In this process the qualities of a product are attributed, stabilized, objectified and arranged (Callon et al. 2002: 199). When the product features and the customers’ interests have been mutually adjusted, an attachment of the product to the customer becomes possible (Callon et al. 2002: 200-01, Callon and Muniesa 2005: 1233).

”The quality is obtained at the end of a process of qualification, and all qualification aims to establish a constellation of characteristics, stabilized at least for a while, which are attached to the product and transform it temporarily into a tradable good in the market” (Callon et al. 2002: 199)

Qualification can achieve a temporary closure when an attachment to a buyer is achieved. However, the markets never stay still, the preferences change and are redefined by marketing, products change, and the products have to requalify again and again (Callon et al. 2002: 199). The reconfiguration of product qualities gives the market its dynamics and enables continuous competition between different products (Callon et al 2002: 200).

According to Callon et al. (2002), the process of qualification consists of three analytically different overlapping and simultaneous elements that enable the

becoming of a tradable good: objectification, singularization and attachment-detachment. Calculations form a significant part of all these dimensions of qualification.

Objectification of product properties are revealed and co-constructed through tests and trials which involve interactions between actors (including consumers) and the goods to be qualified (Callon et. al 2002: 198, 202). Objectification requires specific metrological work and heavy investments in measuring equipment (Callon et al 2002: 199). The qualities of a product have to be stabilized, delimited and definable in order for the good to become attached to the world of the possible buyer (Callon and Muniesa 2005: 1233).

In order for the good to be attached to a new owner it must present value for the buyer. Therefore, simultaneously with the making of the properties of the product these also have to become something that the buyer is attracted to, something that can enter the consumer's world and become attached to it. The properties of the product are adjusted to the buyer's world, if necessary by transforming that world (Callon and Muniesa 2005:1233). Like product qualities, also consumer preferences can be both stable and reconfigurable (Callon et al. 2002: 205). The properties thus become a result of a mutual adjustment between the becoming object of exchange and other market actors. In other words, properties of the product are co-elaborated in a process which simultaneously might change its participants (Callon et al. 2002: 201, Callon and Muniesa 2005: 1233).

Objectification and singularization occur simultaneously and cannot be separated from each other but analytically (Callon and Muniesa 2005: 1233). Singularization, indeed, consists of a gradual definition of the properties of the product and the following individualization of the product. It is the process where the product is made both comparable and different from other products. The product is linked to other products by classifications, clustering and sorting. This establishing of relations between products allows for comparison between goods (Callon et al. 2002: 201, Callon and Muniesa 2005: 1235-36).

When successful the profiling of the product leads to attachment of the good to the consumer. Attachments are constantly threatened. The dynamics of competition between products leads to detachment of the consumers from some products and attachment of them to other products. Yet, stable consumers do exist. These are consumers who do not participate in requalifying products and do not re-evaluate

their product preferences even when detaching attempts from other market actors are evident. Rather, they are "driven by the distributed apparatus of qualification" (Callon et al. 2002: 206). According to Callon et al., these consumers are caught in routines (Callon et al. 2002: 206). A consumer that becomes detached is capable of perceiving differences and grading them. She is supported or maybe even guided in this calculation and evaluation by other market actors such as suppliers, marketing professionals and their intermediaries (Callon et al. 2002: 212-13).

Qualification is one of the main concepts used in this thesis. It is used to highlight the different work related to making a market exchange possible. The focus in this dissertation is on how environmental friendliness achieves stability or does not in the different practices where qualification work is carried out.

## 2.2. Markets as calculative devices

According to Callon et al. (2002) and Callon and Muniesa (2005), calculations are an inseparable part of the process of the qualification-re-qualification process and therefore also markets. Callon and Muniesa (2005) separate three analytically different elements that relate markets to calculation: making goods calculable, making agents calculative and – in some situations – organizing the calculative exchange of the good in a particular way. This approach emphasizes the diversity of possible forms of market organizations: goods can be calculable and agents can be calculative in various different ways, exchange can be organized in thousands of forms (Callon and Muniesa 2005: 1254). As Callon and Muniesa put it (Callon and Muniesa 2005: 1245):

"This calculation is possible only if goods can be calculated by calculative agencies whose encounters are organized and stabilized to a greater or lesser degree."

This emphasis on calculations hinges the point where the constructivists see themselves taking a different turn from many of the sociologists of markets (See i.e. Callon and Muniesa 2005: 1229). Whereas sociology of markets perceives market action as something defined by the cultural and the social, ANT brings in the calculativeness of the market actors. The ANT understanding of calculations,

however, is quite different from the calculations performed by the rational homo economicus in the neo classical economic theory where agents are perceived as calculative by nature and purely quantitative calculation is a norm. For ANT inspired market studies calculations are seen everywhere in the markets, but the forms they take can vary according to how the markets are constructed. Thus, calculations do not only take the shape of quantitative action committed by a rational price-driven actor (Callon and Muniesa 2005: 1230).<sup>9</sup> Also qualitative judgements are seen as a type of calculation. To blur the boundary between pure judgement and pure calculation, Callon and Muniesa suggest the following (Callon and Muniesa 2005: 1230-31):

”Calculation starts by establishing distinctions between things or states of the world, and by imagining and estimating courses of action associated with those things or with those states as well as their consequences.”

The concept of framing<sup>10</sup>, introduced by Callon in his earlier work, refers to this very establishing of distinctions. His notion of framing, however, also articulates the making of these distinctions as unavoidable if calculations are to be carried out (Callon 1998b: 16):

”If calculations are to be performed and completed, the agents and goods involved in these calculations must be disentangled and framed. In short, a clear and precise boundary must be drawn between the relations which the agents will take into account and which will serve in their calculations and those which will be thrown out of the calculation as such.”

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<sup>9</sup> According to the constructivist approach, the homo economicus of the neo classical economic theory, like any other type of calculative agency, is a possibility, yet she has to be seen as an outcome of a rigorous construction work and equipped with devices that allow for this type of calculation (see Tryggstad 2005).

<sup>10</sup> The notion of frame stems from Goffman (Goffman 1971). What seems especially appealing to Callon is the way Goffman establishes the relation to the world outside the frame within which interactions take place more or less independently. The relationship with various physical and organization devices that are found outside of the frame is just as important to the interaction as the physical framework, the stage, the bell, the dimmed lights, are to carrying out a stage performance. In the frame, the world outside is bracketed, but the relationships to it are present (see Callon 1998a: 249).



Besides a broader understanding of what type of action the calculations might entail, another issue distinguishing the ANT take on calculativeness is that calculations, just as basically any other activity, are seen to occur as a result of distributed agency. In order to perform a calculation one actor is not enough: devices and calculative spaces are needed. For example, a consumer who, in order to calculate her preferences, distinguishes between certain dimensions of the product (such as price and position), is a consequence of the marketing mix rather than the cause (Callon 1998b: 27). Both humans and non-humans participate in making the calculation. Single actors can attempt to deploy different devices and networks in order to qualify a product – but the success of their strategy is not in their hands. Instead of talking about calculative actors Callon and Muniesa (2005) talk about calculative agencies, thus emphasizing the centrality of a calculating collective hybrid rather than a human individual (Callon and Muniesa 2005: 1236). The multiplicity of calculations in the market is of significance here. Design, production, commercialization, prospecting, purchasing and consumption involve a large number of calculative agencies. These can be linked to each other, they can compete with each other, or they might just as well be disconnected from one another (Callon and Muniesa 2005: 1236-37).

### **Calculable goods and calculative agents**

In the process of qualification-requalification calculations are performed in order to establish the qualities of the product, to disentangle the product from other products, to compare the products with other products – all in order to render the good for transaction. At the same time these very same acts of singularization also constitute the goods as something calculable (Callon and Muniesa 2005: 1235).

Making a product similar yet distinct from other products necessitates establishing a calculative space in which the product can be compared to other products (Callon and Muniesa 2005: 1235). This calculative space can be offered by an Excel spreadsheet encompassing the names and prices of the competing products or it can be a supermarket where some goods are accepted on the shelves, others not. The calculative space entails a boundary between the relations that will be taken into account in the calculations and comparisons between different products and can thus be seen as presenting a particular framing of the transactional space. By insisting on including particular aspects of the product into the comparison, the frame, however, always shuts out other dimensions of the product. These aspects are potential overflows of the frame. After having been made visible the overflows

can possibly be included into a frame (Callon 1998a: 252) which brings us back to the very dynamics of the process of qualification-requalification. It is through the inclusion of overflows into the calculative frame that re-qualification takes place. The competition and collaboration of the calculative agents in the market is made possible by the activity of framing and the agent's ability to integrate and cross-relate already made calculations and frames to new or existing frames (Callon 1998b: 32).

Apart from presenting a particular framing for the calculation, the calculative space is part of a distributed agency of the buyer (Callon 1999: 183-85). In order to be able to compare products, buyers and sellers need to be equipped with calculative devices (Callon and Muniesa 2005: 1236), like spreadsheets, standards and classifications. These calculative devices are themselves calculative spaces or participate in constructing the calculative space where the products can be compared with each other. Callon and Muniesa postulate that the calculative power of agencies depends on this very equipment and can thereby vary from agent to agent (Callon and Muniesa 2005: 1238) – the differing calculative abilities of buyers are constructed by equipping her with different calculative devices.

### 2.2.1. Organizing of a calculative encounter

Callon and Muniesa (2005) state that there is a difference between the calculability of a product or the constitution of calculative agencies, and the calculability of market configurations that order and organize the encounters between demand and supply (Callon and Muniesa 2005: 1241). Market practices like auctions or EU public tender processes are examples of this type of ordering configurations. Callon and Muniesa (2005) call these specific organizations of transactional spaces algorithmic configurations (Callon and Muniesa 2005: 1241):

”in other words, the formulation of rules or, more exactly, algorithms that make it possible to identify the agents authorized to engage in transaction and to describe the order in which bids and offers should be taken into consideration...”

Algorithmic configurations define the group of calculative agencies that can participate, they organize their encounters and connections to be made, and

establish the rules or conventions that set the order in which these connections must be treated and taken into account.’ (Callon and Muniesa 2005: 1242) Although orchestrating the market organization as such might be analytically differentiated from the process of making a product calculable or market actors calculative it cannot be fully separated from these. The way agents become calculable or the qualities that can be calculated are often given in the very rules of the market encounters.

Callon and Muniesa emphasize that these algorithmic configurations are not structures that already exist. Rather, they are created and constructed, and agencies may participate in the design and negotiation of ordering configurations<sup>11</sup> that organize market encounters (Callon and Muniesa 2005: 1243). The performative aspects of calculative devices enacting and representing the emerging market configuration have been emphasized in the work of Kjellberg (2007) and Tryggestad (2005).

## 2.3. Multiplicity

Behind the concept of qualification lies a specific understanding of a product. Callon et al. describe a product<sup>12</sup> as a sequence of transformations by the different actors involved in its design, production, distribution and consumption (Callon et al. 2002: 198). Product is something that gets transformed, adjusted, iterated and defined. Carrying resemblance to the ANT stance on scientific facts, product qualities are co-constructed through tests and trials which involve interactions between actors (including consumers) and the goods themselves. The revelation of the product qualities often implies specific meterological work and heavy investments in measuring equipment (Callon et al 2002: 199-202). This implies

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<sup>11</sup> Fliegstein (2001) calls these the architecture of markets. The strongest difference between Callon and Muniesa’s approach and Fliegstein is related to the role ANT grants the non-human actors. For Fliegstein, architecture of markets is socially constructed whereas Callon and Muniesa see the market configuration as an outcome of distributed hybrid agency where both humans and non-humans participate.

<sup>12</sup> Callon et al. (2002), distinguish between goods and products. ”The product is thus a process, good corresponds to a state, to a result or more precisely, to a moment in that never ending process... Defining a good means positioning it in a space of goods, in a system of differences and similarities, of distinct yet connected categories.’ (Callon et al. 2002:198)

that qualities of the product are neither something intrinsic nor something extrinsic to the product (Callon and Muniesa 2005: 1234). Qualities are therefore not something that can be observed in the product at any times. Neither are they something that can be given to a product passively waiting for its label.

De Laet and Mol (2000) call these reconfigurable boundaries of a product 'the fluidity of a product' (De Laet and Mol 2000: 237). In their article on Zimbabwe Bush Pump de Laet and Mol (2000) take a concrete product, a water pump, and show how fluid the boundaries of a particular product can be. The pump can be approached as a water lifting device, health promoting device, community maker and a state maker. In a very eloquent way de Laet and Mol succeed in making the fluidity, the reconfigurability of boundaries of the product visible (de Laet and Mol 2000: 237).

This argumentation comes very close to the notion of interpretative flexibility of an artefact in STS. According to Bijker et al., it is the social groups and their meanings and understanding about the artefact they are concerned with that play a significant role in defining the way in which the artefact develops (Bijker et al 1987: 30). People can interpret a particular artefact in different manners and artefacts can thus also be designed in many different ways to meet many different needs and meanings (Bijker et al. 1987: 40). However, true to the semiotic background of ANT de Laet and Moll strongly argue that this fluidity must be distinguished from understanding the product as having interpretative flexibility, that is its identity changing according to the interpretation it is given. The product should not be seen as an empty object ready to be filled by an interpretation. Rather, the product consists of different worlds (de Laet and Mol 2000: 252). An object has a variable ontology (Latour 1996: 173) or, in other words, a variable geometry (Callon 1991: 154, Latour 1996: 24).

In her article on ontological politics, Mol (1999) very eloquently discusses the difference between understanding reality or any other object as ontologically plural or as ontologically multiple. According to her, maintaining that the reality depends on the viewer's standpoint or how it became constructed does not make it possible to see, how different versions of the reality or an object can not only clash against each other but also relate to each other, be co-constitutive, sequential or coexist. In order to see this, we need to see reality or an object as something whose different versions are performed and enacted with the help of tools in specific practices (Mol 1999: 77). In this thesis, then, environmental friendliness can be approached as a

version of a product that is constructed with the help of different tools, i.e. life cycle assessments or product data sheets. Furthermore, an environmentally friendly urine bag is but one version of the product. Other ones could include a night bag, a bag that can take 500 ml urine, a bag that enables Hannah to participate in wheel chair rugby and so forth.

It is not only the local enactment, but also the nature of enactment that is of significance here. By focusing on the tools and the materiality of practices, Mol makes a point that is perhaps best known from the discussion on the nature of scientific knowledge. ANT, contrary to STS, enrolls the non-humans into the making of knowledge. It is not only the researcher and her human connections, but also the tools, the facilities and the object of inquiry that act in producing this knowledge (See i.e. Callon and Latour 1992).

### 2.3.1. Coordinating multiplicity

Mol (2002) has been working with the coordination of multiple versions of an object in quite a different sphere than markets; namely diagnosis and treatment of atherosclerosis. She observed how atherosclerosis was enacted in different parts of a hospital, a consulting room, pathology laboratory, radiology department and the operating theatre, to name a few. In each of these locations a different version of atherosclerosis was produced. By following the different practices the single atherosclerosis multiplied, it became multiple. Mol's work on how these different versions of atherosclerosis were coordinated and related to each other in order to produce unity and singularity as well as how the versions were kept apart is interesting in relation to this dissertation.

Mol investigated how different versions of atherosclerosis were coordinated with each other – often to overcome a controversy that otherwise would have made a diagnosis or a treatment decision difficult. Mol found two forms of coordination: addition and calibration. When two versions of an object clash a hierarchy between them is made and one of them is made to win. In this book I refer to this as privileging, a concept used by Sjögren to denote that one of the version is to win (2006: 49). Another version of addition is to perceive any of the versions as a sign of a particular reality – here any symptom gives reason to treat a patient. The second form of coordination, calibration, took place, when two different versions

were translated into one and made comparable. The results of angiographic images were, for instance, converted to the same form as those of duplex paragraphs (Mol 2002: 84). Here, however, a divergence between the results of these two measuring techniques can still occur. This makes the two modes of coordination qualitatively different. Versions of an object are related to each other, but only addition aims at solving a possible controversy.

At the hospital, the different versions of atherosclerosis were not always coordinated with each other – sometimes they just co-existed. Mol noted that diverging objects were kept apart if bringing them together would result in too much friction. This was done by distributing the different versions so that they would not meet. Different versions of atherosclerosis could be performed in different moments of a treatment process: the diagnosed illness could be different from the one that was treated. Atherosclerosis could also change over different types of patients. Different atheroscleroses could also be seen as a part of each other: a bad condition would occur at a late stage of a gradual process of deterioration, both enactments of atherosclerosis. Furthermore, atheroscleroses could be kept apart by attending to the conditions of possibility. Atherosclerosis as an encroached artery might not be a possible enactment once a medical treatment for a chain of blood clotting mechanisms is found (Mol 2002: 115-17).

Besides the coordination and separation of the different versions of the object, Mol was also interested in the relationships between enactments of different objects. Objects have complex relations and their size and characteristics is produced in the relations they have to each other. One could not, for example, say that a blood vessel was smaller than the patient operated. In the operation theatre, it was the vessel that got all the attention. At a family dinner, the artery might have become smaller than the person laughing with her relatives. These two realities existed side-by-side. Some of the objects mutually included each other: a population includes an individual, but an individual can also include the population. Her diagnosis is sometimes done based on what is expected according to the populations she belongs to (Mol 2002: 149-50). Sometimes these mutual inclusions result in tensions. Even if an individual treatment of a patient made her feel better, this did not necessarily lower her risk of dying of atherosclerosis any time soon. In terms of the distribution of the disease in the population this treatment would not have a positive effect (Mol 2002: 134-37). Furthermore, sometimes objects interfered with each other; their versions might give a specific shape to some version of the other. This could, for instance be seen when a

particular atherosclerosis was approached in the light of being situated in a female leg: "this is quite bad for a woman" (Mol 2002: 147-49).

### 2.3.2. Multiplicity in qualifying

In qualification, the different versions of the product do not only get enacted – they also get coordinated in quite a particular manner that aims at achieving a practical closure, that is choosing one product over another. Thereby some of the product qualities are made more significant than others. Thus, product properties are performed in order to position the goods in systems of differences and similarities in order to allow for the competition between goods (Callon et al 2002: 198). This work of positioning leads to enacting and coordinating different versions of the same product as the product becomes related to other products and their qualities. Thus, the dynamics of qualification-requalification rest on the possibility to multiply the versions of a product. Besides making product properties, the process of qualification and requalification is, however, also about limiting them in order to be able to compare the products with other products.

In the process of making products comparable, we can trace at least two different forms of relating and coordinating different product qualities to each other. Firstly, in order to become comparable yet different from other products, the product has to have objectified properties (Callon and Muniesa 2005: 1233). These properties can be approached as different enactments or versions of an object. In different settings, the versions of an object can be different from each other to an extent that the only thing they have in common is the name of the product. However, in order to enter the comparison between different products some of the enacted qualities – or different enactments of a product – must be brought together and coordinated in order to make a singular product with clearly identifiable qualities. This type of coordination is the coordination that Mol talks about, coordination between different versions of the same, though multiple object.

Secondly, comparison of different products takes place in a calculative space where products are related to each other through their qualities. This is what makes the singularization of the products (Callon and Muniesa 2005: 1235). As there are practical closures in the process of qualifying, closures like purchasing decisions, relating the different products has often to lead to privileging one product over

others. This can be made in at least two different ways. Some product qualities can be privileged over others by making them decisive for the selection of a product. Here, a particular product quality, environmental friendliness for example, that can be enacted as a quality and a version of one particular product also becomes a generic quality which all the products have to relate to, positively or negatively. If environmental friendliness is privileged amongst different qualities enacted in the calculative space of product comparison, it will affect which product is chosen over other products. Different products can also be compared regarding the same quality. The product that performs best regarding this quality is chosen.

These two modalities of coordination are dependent on each other. The comparison of product qualities across different products affects the way different product qualities are enacted and coordinated within one object. Furthermore, the enactment of product qualities of a particular product might influence the form acquired by the calculative space that enables comparison between different products. Due to the travelling back and forth between an object and the space where different objects are related to each other, a tension between a quality as an enactment of an object or an enactment of a generic object occurs. Therefore, the act of coordination is not necessarily about relating the qualities of an object, i.e. a particular urine bag, to one another. It is also about relating the properties of this device to the qualities of other devices, for example to different urine bags. Sometimes the qualities are also, to some extent, stabilized in the product group level: a urine bag is a bag, it has a tube and a specific volume and so forth. Thus, the qualities of a specific bag can also be related to these generic qualities of the product category.

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This thesis, as has been noted before, shares the constructivist view on markets. In the three empirical chapters of this dissertation, I wish to empirically investigate the role environmental friendliness plays in folding out of a qualification-requalification process related to a particular product type, urine bags. Qualification is thus one of the main concepts taken further in this study. Besides qualification, the concept of coordination is used as an analytical tool to highlight the different modalities of comparison between and ordering of product qualities. Furthermore, the concept of framing is extensively employed in the analysis, though most notably in the chapter investigating the public arena.



# 3. METHODOLOGY AND METHODS

In this chapter, I will discuss the way I have organized my empirical work, case study as a research approach, gathering field materials and writing this case. Apart from my theoretical position a number of practical circumstances have influenced the way my research methods have evolved and the way the research practice has developed. As Gad and Jensen (2007) note, a research project is always influenced by practical circumstances (Gad and Jensen 2007: 23). These practical circumstances will be reflected upon in the course of this chapter. Furthermore, I will discuss my own work in relation to the criteria for "good" science.

## 3.1. Case study

I have approached my topic of research, greening of markets, through a single multi-sited case study. My empirical study takes a particular product, a urine bag, as its point of reference. In empirical terms, the case study presented in this dissertation is a case of environmental friendliness in the qualification of urine bags.

Statistical surveys might be able to find some similarities and discrepancies as well as regularities between markets for different products or within markets for one product. However, it is very difficult to grasp markets in the making by conducting a statistical study on them. A qualitative case-study, on the contrary, allows for a detailed understanding of the processuality and longitudinal aspects of the object of inquiry. Furthermore, case study as a research approach enables production of detailed and context-dependent knowledge. Case studies offer closeness to real-life situations and help in creating nuanced views of the object of inquiry as it unfolds in practice (Flyvbjerg 2004: 422). This, I hope, has allowed for a richer

description of how urine bags are qualified and re-qualified as more or less environmentally friendly products on the market.

Focusing on a particular product has, indeed, made it possible to locate the coordination of product qualities including environmental friendliness in concretely anchored events, and, furthermore, to follow the interaction between different actors in various settings. The product focus has also enabled an understanding of the limits of environmental considerations in product related assessment practices. Moving beyond the boundaries of one organization, i.e. a producer for urine bags, has been necessary in order to grasp the distributed nature of the process of qualification and re-qualification of products and the simultaneous construction of markets.

My choice of a product for the case study was very much a blend of pragmatism and scholarly interest. There are thousands of products perceived as environmentally friendly. There are environmental technologies like wind power, eco-cars or waste technologies. There are eco-labelled consumer products: food, sanitary articles and even services. Investigating all of these different product areas was simply not a possibility within the scope of a PhD-project – if at all. Choosing to conduct a case study on one or several products did, on contrary, give me a possibility to study a particular market and how it evolved in depth.

Originally, I was interested in markets for a product whose main function was not perceived as mitigating environmental hazards, i.e. sewage technology or catalysts. Furthermore, I was interested in a product, whose environmental impacts had in some way been debated and negotiated. This turbulence, I hoped, would guarantee insights into the process where the environmental qualities of the product were either stabilized or not stabilized.

I discussed my research idea with several people from different enterprises that I had gotten in contact with in another, yet linked project. Further negotiations were initiated with two enterprises that showed interest and whose product also fitted with my previously mentioned interests. One of the companies, however, chose not to participate in the study which left me with a single case. This turned out to be fortunate, as I realized the complexity of the case.

Even though it relatively quickly became evident that only one of the enterprises would stay in the project, the case was far from completely defined. The next step was to decide which national market I would concentrate upon. I chose to proceed with locating my study in Denmark for two reasons. The environmental concerns related to the product group had, on contrary to many other countries, been heavily discussed in Denmark for years. On the other hand, I myself was located in Denmark which would make it easier for me to coordinate and organize interviews and gathering of field materials.

Even though necessary, these preliminary definitions of the location and topic of the case were by no means pre-empting as for defining the boundaries of the case study in mind. Actor network theory provides very clear advice for gathering field materials: follow the actors (Callon 1986: 201, Latour 1987). Because of this very advice, ANT is often accused of placing the researcher in an impossible situation: if an actor gets its agency from its network, following the actor becomes an endless task. In practice, this explorative following of the actors, however, proved to be very helpful for drawing the boundaries of the case. While reconstructing the chain of events that had (potentially) influenced the role environmental friendliness played in the market for urine bags, also the boundaries of the case became gradually visible and drawn. Besides the shape of the choreographies of different actors and the length of the related chains of associations, also pragmatic constraints like limited time and limited access to different field materials came to set some boundaries for the extent to which actors could be followed and thereby for the case. In the following I will discuss the boundaries of this case in two respects: locations and time.

### **3.1.1. Negotiating the boundaries of the case: access to localities**

As already noted, markets for environmentally friendlier products could be studied in numerous products groups and in numerous national markets. My definition of the product group, a particular urological assistive technology, and the focus market, Denmark, posed some boundaries for my inquiries. Furthermore, boundaries related to time span and spatiality within Denmark would have to be drawn. Drawing these boundaries turned out to be an iterative process where I was partly guided by my actors in the case, partly by the limited nature of time

allocated for gathering field materials and partly by the denial or granting of access to different locations and materials. The resulting research design presents the outcome of this boundary-making and boundary-searching.

Modern organizing takes place in multiple, fragmented contexts (Czarniawska 1998: 28). Likewise, neither the construction of markets for urine bags nor stabilizing of environmental friendliness as a product quality can be assumed to happen in one place (cf. Czarniawska 1998). This is clearly reflected in my research design both in terms of including actors and events from and beyond marketing, selling and procurement, as well as trying to grasp the multiplicity of practices in procurement and use. The idea behind bridging the producer/seller – buyer divide is to inquire how environmental friendliness, here PVC-freeness, becomes or does not become stabilized as a product quality in different market constructing practices. These market practices include practices that shape the object of market exchange, carry out procurement and constitute particular market configurations. Investigating these different practices made me also investigate the borders of the case.

As Czarniawska (1998) writes, studying of networks or action nets, as she calls them, present their own challenges to the accessibility of the field. As there are many actors and many – also simultaneously – occurring negotiations, there are many possible access situations and many cover stories. The access is never secured at once. Somehow the situation has got no "inside" that the researcher can locate herself within and from which she can obtain knowledge about everything needed. As Czarniawska states: "being inside is being outside of another". The same concern has been addressed by Law in relation to conducting ethnographic work: "where the ethnographer is, the action is not" (Law 1994: 45). Access easily becomes a bargaining issue and can never be obtained simultaneously to all situations (Czarniawska 1998: 34).

I found getting access to the field to be an ongoing process of negotiation. The character of this process was further accentuated by the dispersed locational nature of my research design. Getting and not getting access influenced my choice of method for gathering field material, the material available for my analysis – and my analytical focus. As I experienced restrictions in collecting data I had to reconsider the content and focus of my study.

I first gained contact to the organization producing the urine bags through the consortium that my research project was part of. One of the bags produced in this company was claimed to be environmentally friendlier than its competitors. This was also the reason why I became interested in including it in my investigations. Also the enterprise was interested in my research ideas which gave me a possibility to follow the product to one of the sites where its qualities had been negotiated: product development, production and marketing. However, confidentiality issues did restrict my access to materials on sales development and price formation. This agreement of confidentiality led to deep conversations and negotiations with the company regarding which information was publishable and which was not. I still had to develop contacts to the persons relevant for product development, international marketing and Danish marketing, many of whom did not work for the company any more, and people taking care of the archives of the company. Organizing interviews was mostly possible, but sometimes I could not get the interviews I would have wanted to.

While investigating the chains of events contributing to the emergence of the "green" product I was introduced to a number of other actors influencing the birth and the formation of this product, including the political debate on PVC-freeness. This led me to conduct investigations regarding the different events, initiatives and debates that had taken place in the public arena around the environmental concerns related to urine bags in specific and PVC as a material in general. Here, I decided to keep to written materials: reports, articles, political programmes, written down parliamentary discussion etc. which made the question of getting access a question of availability.

My next step was to follow the product to where it was used and procured. From the producer enterprise I had learned that their products were used in numerous different municipal and county organizations, both by professional users, nurses and doctors, and end-users, i.e. people suffering from incontinence. An end-user can be a client in a county hospital and get her device financed by her home municipality upon rehabilitation, and later on return to the same or a different county hospital. Due to this complex customer-institution relation, her choice of device might very well be reassessed and remade according to different standards in the municipal and county regimes and different institutions. At times, decisions made in another institution might influence the successive decision when the client

changes institutions or moves from the county regime to the municipality or vice versa.

After acquiring a preliminary understanding of where the product qualities were possibly negotiated on the user side, I decided to proceed in a way that would give me a possibility to shed light on these different types of practices and to uncover possible subsequent procurement and user decisions when the product carrier moves from one setting to another. In practice the latter meant i.e. that I sought to interview nurses from hospitals under the same county whose procurement officer I had interviewed and nurses in a municipality institution whose clients had been treated in this very hospital department.

Alternatively, I could have concentrated on one procurement agreement process and one needs assessment situation. There were two reasons for not choosing this path. First of all, I wanted to have some variance in terms of locations in order to investigate how environmental friendliness was stabilized or destabilized in different types of practices. Despite the range of different locations, I did, however, encounter practices that were in many ways rather homogeneous in terms of how environmental friendliness was taken into account. I ended up visiting many different locations in my search for finding something that could contrast with the other locations. Secondly, as the interconnectedness of the municipal and regional procurement and use practices became evident, I wanted to investigate the possible interdependencies of these practices in relation to environmental friendliness. Had I been concentrating on one or a couple of settings only, I would easily have missed the dynamics of interdependence in the chain of successive trials.

Pre-existing knowledge about the extent to which environmental friendliness as a product quality is discussed in different relevant municipal and county organizations in relation to this product group is very limited. This meant that grounds for selecting particular counties, municipalities and related institutions like hospitals and care homes were vague. From my contacts in the producer company and during a literature search I had come across some references to one county that had supposedly been active in this respect. Apart from that, no material relevant for selecting different procurement units or professional user organizations exist. Besides conducting an interview in the procurement office of the "front-runner"

county<sup>13</sup>, procurement offices in one municipality and another county, that dealt with each other's clients, were visited. I furthermore initiated discussions with a third county procurement office but did not get access to their procurement process. In this third county, I had already been allowed an interview in a county hospital. The clients from this county hospital often come from the municipality I had previously visited.

I very quickly realized that getting access to the procurement documents would be one of the hardest parts of my research for two reasons. Firstly, the procurement organizations do not keep the documents for more than five years, after which they are archived for an extra five year period – and all this only if the procurement has been carried out as an EU public procurement agreement process. These documents would not be requested from the archives for the purpose of my research. Secondly, despite of my requests, I was not allowed to see the existing procurement documents in their totality for confidentiality reasons. I managed to get access to some environmentally related tender documents. Because of this, detailed descriptions of the procurement processes and especially of the role played by different product qualities could not be based on written materials. Consequently, interviews became my primary method for acquiring field materials on the procurement processes. However, the same confidentiality issues kept the interview material on a somewhat generic level.

Besides the three procurement offices, I made interviews in urological departments in three county hospitals in the above mentioned counties and in various different municipal institutions in the municipality of Solbæk. These included a self administrating care home, a municipal care home, a municipal centre for people with disability, two municipal home nursing units and three different administrative units. Furthermore, I visited two regional rehabilitation centres for disabled people. I chose to make interviews in two independent special rehabilitation centres that provide clients to several municipalities and counties in Denmark, yet loosely connected to the two counties I visited. In addition, I also interviewed a sales consultant of a whole sale company and a procurement expert in the Association of Regional Authorities. Getting access to all these locations

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<sup>13</sup> From January 2007, the counties were abolished and newly established regions took over their responsibilities in my area of interest. Because most of my interviews took place and dealt with the time before this shift, I have chosen to refer to counties instead of regions.

was, however, hard work: I was denied access to almost as many organizations as I gained access to.

Following the product to places where its qualities were negotiated and compared with each other in order to make a use or procurement decision provided a starting point for finding relevant practices to investigate. Given my specific interest in how the environmental qualities were established and possibly stabilized, these events of quality negotiation very clearly showed the borders of my case. In the majority of practices, environmental qualities of the product category were not discussed. Environmental friendliness seemed to appear in one event – only to disappear in the next successive assessment of the suitability of the device. With this observation in mind, I grew interested not only in how the environmental qualities were coordinated with other product qualities but also in how they were not coordinated. By stepping outside of the network created around environmental friendliness I was able to concretize its borders.

### 3.1.2. Negotiating the boundaries of the case: time

My interest in inquiring into both the shaping of the market object as well as its customers indicated that my study would be at least partly historical and longitudinal. In the scope of the three years reserved for a PhD project it would not be possible to investigate a product development, its launch and maturing in the market. The final time span, however, caught me somewhat by surprise. As I first entered the negotiations with the firm producing the specific "green" product, I was told that it was launched in the beginning of the 21<sup>st</sup> century. I later learnt from a person that had participated in the product development that the product entered the Danish markets already in 1993. The product development project had started in 1988, and the discussion leading to this project already way before. This expansion of the time span was to affect my possibilities to acquire field material especially on the customer side.

Initiatives and attempts to problematize the material used in urine bags in terms of its relation to the natural environment started to occur in the public arena even before the product development discussion first appeared in the producer enterprise. However, aspiring customer interest and intensified public debate on the product material seem to occur more or less around the same period of time as



the start of the product development: from the mid to the late 1980s. This period of time, then, became a starting point – though a rather flexible one – for my inquiries. Reaching so far back in history proved, however, to be difficult with the material it was possible to acquire on procurement and use of urine bags. Despite some single interviews with people that have been working in the procurement and use of urine bags since then, it was not possible for me to reconstruct time wise coherent accounts on the development of use and procurement practices in all locations.

Finding a suitable beginning for the study was rather easy yet surprising. Finding a suitable point of exit in time did, however, prove to be more difficult. The further I proceeded with my inquiries into marketing, procurement and use, the less convinced I became that there had been any clear closures in the way environmental friendliness had been negotiated. My choice of time span was – once again – pragmatically informed. While interviewing informants, I realized that the most detailed articulations I received dealt with their present practices. Therefore, I decided to continue the study all the way up until today. I will elaborate on the challenges in covering the time between today and the late 1980s in the following discussion about field material gathering methods.

## 3.2. Gathering field materials

My interest in realities enacted and performed often long ago and in situated practices posed a number of challenges for my choice of material gathering techniques. According to Czarniawska (1998): "the attractiveness of all such [research] techniques needs to be measured against the degree to which they permit one to tackle the peculiarities of modern organizing: the condensed time, the simultaneity of events taking place in different settings, and the invisibility of a growing part of operations" (Czarniawska 1998: 31). The main challenge was therefore how to assemble a combination of methods that would resonate with the various different practices in which the product and its qualities were negotiated in product development, marketing, procurement and use – up to twenty years back in time.

In this type of explorative studies it is not possible to a priori decide what type of methods will be used. In practice my multi-sited, historical research design set a number of practical limitations for my material gathering techniques. Methods like different types of observation techniques were not possible due to the historical nature of the practices. Furthermore a number of practical limitations in terms of confidentiality and non attainable field relations shaped the way I gathered my field materials and the form it came in. In the following, I will elaborate on my activities to collect interview and written materials as well as other semitextual artefacts. Interviews and gathering written and semi-textual documents have allowed for following the actors from a timely distance as well as made it possible to carry out research activities in geographically dispersed locations. Interviews have furthermore helped getting insights into those events that have not left any material trace.

Before starting a more detailed account of my field material gathering, there is one issue I would like to highlight. My material gathering has attempted to enable the reconstruction of historical practices. At times this has been more than difficult: some practices have left no traces or the traces are weak, barely visible. There are no documents to find, or these documents are not accessible. The people involved in these practices have been forgotten, are not available for interviews any more – or cannot remember. I have attempted to overcome the weakness of traces by looking for them in several places: archives, publications, interviews with participants. Reconstructing the process has been partly possible after relating the different materials to each other. On some occasions, particularly regarding procurement practices and needs assessments; I have not been able to produce field materials that would have made writing up a consistent narrative developing over time in different locations possible.

### 3.2.1. Accumulation of field materials

In principle, the process of gathering field material for product development, marketing, procurement and use of urine bags consisted of three different elements:

- 1) Accumulation of field materials in interviews and from other sources.
- 2) Writing up empirical accounts based on accumulated field materials.

- 3) A possible second round of interviews based on the empirical accounts to gather emic comments and check technical details in order to avoid errors and misunderstandings in the empirical account.

In the case of procurement practices, the empirical accounts were written after the interviews and sent to the interview persons for further comments in the county of Fredenshus and in the municipality of Solbæk followed by a second round of interviews. In addition to getting the interview persons' reactions to the accounts, I attempted to use these empirical accounts as stories which could facilitate discussions on the differences between today and earlier times. My interview with the procurement officer in Arnæs took place late in my research period which led me to pose some further questions and clarifications by e-mail and by telephone to enhance my understanding of their procurement practice.

The empirical accounts on hospital and private use as well as municipal financing decisions on single devices were not rotated with the interview persons. The reason for this was partly that decision-making and device assessments described in these interviews stood out as momentary contrary to the other accounts that described series of events in longer-lasting processes. I felt that after an interview I was able to reconstruct the situation of individual needs assessment and product recommendation. However, as before, I returned to some of my interview persons posing clarifying questions as needed.

Contrary to other practices, in product development and marketing, these empirical accounts were written up gradually, first as a list of product development events and decisions in a chronic order, later on as a narrative of the product development process. The list of events and decisions was used and updated in interviews with new informants and further discussions and interviews with some persons who had already been interviewed. When no more interviews with new informants on product development were anticipated, the product development story in its total or relevant parts for a specific informant were sent to the interview persons. Again, some second round interviews were conducted. The reason for treating product development and marketing differently from the user side was connected to the nature of these practices. Whereas needs appraisals and even procurement agreement processes were time wise much more concise, the product development and marketing practices covered several years and featured frequent changes in participants.

My analysis related to the initiatives and debate taking place in the public arena was solely based on written materials.

### 3.2.2. Interviews

All in all, I conducted 46 interviews with 40 persons from 21 different organizations (see Appendix I: List of interview persons and organizations). Nine of these organizations were part of the same municipal organization and three belonged to the same county. Three of the interview persons were end-users and did not belong to any organization. 16 people were interviewed in Coloplast group and Coloplast Denmark, some of them several times. The interviews lasted between 15 minutes and 3 hours. I have chosen to refer to the interview persons by their formal position and pseudonyms rather than their real name. I have also anonymized locations. The only exception to this is the producer of Conveen Security+, whom it would have been impossible to anonymize as long as the product type is mentioned.

In the interviews, I attempted to use questions encouraging description in order to get the interview person's account of the events and process in question, how it evolved, what and who participated and so forth. I was also interested in what has generated a particular orientation of action. However, I do believe that the accounts of the interview persons on what has happened are just that and therefore also necessarily coloured by their person and history.

All interviews except one where an acceptance was not obtained from the interview person and one where a telephone conversation turned into a 15 minute interview were recorded and transcribed by the author. I transcribed the first interviews word by word, but as my time got scarce and the research question more focused I chose to be more selective in the transcription work. The transcriptions therefore entail both verbatim and more summarizing elements and encompass approximately 70% of the total interview time.

#### *Identification and selection of interview persons*

In relation to product development and marketing, finding the interview persons was very much defined by who had been participating in the product development and marketing. The product development documents gave me a good

understanding of who had been involved. Some names were also given by my interview persons. The method of identification and selection of interview persons could therefore be characterized as a snowball selection inspired by archive as well as interview material.

In relation to the public procurement processes, I chose to interview procurement officers that had been involved in the procurement processes of the product in question. These processes are often run by one particular person, whom it was therefore easy to identify.

My quest for interview persons in the municipal elderly and handicap care was a mix of finding out who was involved in the decision-making process and in which role. Having defined which organizations used the device I got in contact with professional users in municipal and regional institutions. In the municipal organization I talked with a number of people in the community care for elderly and disabled before I found persons that dealt with the particular device and would be able to take time off to talk with me. The selection process amongst the relevant professional users was very much characterized by who had the time and willingness to be interviewed. Professional users could inform me about who in the municipality made the administrative decision considering the procurement of the device.

In the hospitals, I decided to concentrate on the urological departments where I was often forwarded to the head nurse, who could guide me further to one of the nurses that was willing to give an interview. I assume that I was mostly referred to nurses that had a long career and authority in working with continence issues. I requested interviews foremost on the practice of choosing continence devices and therefore at no point in time experienced that I would have been referred to a person that was extra favourable for environmental friendliness.

Getting in touch with end-users of the product was difficult, and despite my inquiries to the relevant patient associations only one user returned my interview request. My informant in one of the regional rehabilitation clinics organized two interviews with two of their clients. All in all, I interviewed three end-users, two of whom used the specific product in question and one who used another product from the same producer. None of the end-users lived in the municipality whose procurement practices I studied.

### **Problems with interview materials**

A potentially problematic feature with interview materials is that in interviews covering historical processes it is very difficult to avoid a posteriori rationalizations of taken actions. This becomes problematic when combined with the aim of my research: to reconstruct the course of action without taking the outcome of the process as a sign of a linear and unambiguous process where the present situation is achieved because it was the most natural and best solution. In the interviews I have tried to ask questions about the deroutes and alternative solutions considered in order to track what kind of process has taken place. Furthermore, available documents have revealed long forgotten discussions and abandoned solutions and thus helped to reconstruct memories in stead of post rationalizations in the interviews.

After some interviews, I was left with uneasiness about whether the responses I had received had been coloured by my interview person as a reaction to me telling about the focus of my project, environmental friendliness. These feelings of "green washing" were rare and where possible I tried to take them into account when collecting other field materials.

### **3.2.3. Written documents and semitextual communication tools**

I approach the written documents like memos or letters and communication tools consisting of both text and other elements as traces of practices, discussions and decisions made at the time the documents were written. They are, as any piece of field material, a reconstruction of the situation made by a particular person with particular tools and mind and should therefore not be approached as the only way of understanding the long-gone situation. My assumption is that these documents were also relevant for how the situation developed further: they often communicated decisions, arguments, understandings about situation, and requests to people involved.

A plentitude of archive material was available for the product development part of the study (see Appendix II: List of product development materials). I was allowed access to the product history file of the product development process which provided me with extremely interesting and detailed material about the process and

decisions taken along the way. In addition, a staff bulletin and the internal website proved helpful.

As for marketing, written documents were far scarcer. Unfortunately, most of the marketing materials had been destroyed in a fire some years ago. I was, however, fortunate to obtain some marketing materials from the past years (see Appendix III: List of marketing materials).

Procurement related written materials were difficult to obtain – the difficulties have been explained earlier in this chapter. However, at times I was lucky enough to get access to the artefacts used in the process of procurement. These Excel spreadsheets, questionnaires on the environmental qualities of the product subjected to a tender, marketing material, product packaging and so forth provided me with a valuable source of material considering the procurement and marketing practices. Procurement policies and statements of the counties and municipalities provided another source of field materials. Furthermore, research reports from the Danish Environmental Protection Agency sometimes included interview citations and references to concrete actions taken by municipalities or counties.

Had I had more detailed field materials about the procurement processes, even material collected in a real time participant observation, I could have produced thicker descriptions about these processes. The focus in the analysis could have been different accordingly. I could probably have gotten closer to the means and practices of relating, comparing and coordinating different product qualities in micro-level interaction. Obtaining material on procurement practices in different locations can be seen as an attempt to compensate for the lack of detail in particular procurement events. By looking at different procurement processes I have been able to highlight differences in taking environmental friendliness into account and coordinating it with other product qualities.

Another weakness in my textual field materials was the absence of any material on the professional use of urine bags from previous years. Accordingly, the biggest problem I encountered in relation to the use of urine bags was getting to the possible developments in professional use practice over time despite of some of my interview persons having had a long career in the health care sector. Written documents, standards or advice, could have helped me in reconstructing the practice of use.

More than often, given my methodological standpoint in materialistic constructivism, I perceived the lack of access to produced and used written documents and other devices as problematic. In my interviews regarding the supplier and the user side, therefore, I also tried to ask for the devices used in the process.

My analysis related to the initiatives and debate taking place in the public arena included relevant reports from the Danish Environmental Protection Agency, Political Programmes, as well as Parliamentary questions and related discussion. Furthermore, press releases of the Danish PVC-information Council (1997-2007) provided me with relevant material on the industry initiatives and standpoints and gateways to PVC-related discussion in the media. A broader coverage of discussion in the media – together with interviews – would have strengthened the analysis presented in this dissertation.

### 3.3. Writing up

As mentioned previously in this chapter, my field materials have been produced in close cooperation with the actors in my field. They have told me about their practices, answered my questions, showed me what they do or have done and sometimes even commented on my written accounts on their practices. I have also received written and semi-textual materials that have been produced by the actors of the field.

In writing up my empirical account on different practices, then, I have been deeply dependent on these co-produced field materials. However, the dissertation text itself is of slightly different character although building on the co-constructed field material and the empirical accounts based on the field materials. In writing up the thesis, it has been me as a researcher who has assumed authorship in editing, selecting the interesting and relevant, dramatizing and analysing the field materials and the broad empirical accounts based on these.

My analytical approach has developed and changed through different events and encounters. Encounters with my topic of study have raised interesting aspects and possible focus points, and analysing the produced field materials has time after



time surprised me with the new aspects that can be revealed. Furthermore, comments and discussions from colleagues have shown alternative ways of approaching both materials and my research questions – which has in some cases made me pose questions to my interview persons that I did not imagine before. Even though the project is not theoretically driven, I cannot negate the role of the analytical concepts in the process of analysis: they have clearly helped me in concentrating on particular issues.

As for the text at hand, my analytical work has focused on 1) how and in what forms environmental friendliness is enacted as a product quality in different practices and settings, 2) how and to what extent has environmental friendliness been (attempted) stabilized as a product quality in these practices and settings, 3) how is the work of stabilization carried out in relation to coordination with other product qualities, and 4) how do the stabilization/destabilization efforts relate to each other across different settings.

My empirical analysis fell into three different parts: one on environmental concerns related to the product material in the public arena, one on product development and marketing and one on use and procurement. The first step in the analysis, then, was to organize my already existing empirical accounts regarding the above mentioned questions. For the first empirical analysis on environment in the public arena, it was not relevant to concentrate on product qualities as such, but rather on qualities of the product material and how its environmental friendliness was enacted and stabilized or destabilized. Furthermore, I focused on the influence that the emerging stabilizations and destabilizations might have on further stabilizing a particular enactment of environmental friendliness in product development or procurement and use.

As for the user and supply side analysis, the focus remained on environmental friendliness as a product quality. These two analyses differed from each other in regard to the amount of locations that have been included in the analysis and the time wise distribution of practices. User side analysis draws on many reoccurring practices in different sometimes interrelated locations, whereas product development deals with a time wise long process where environment becomes enacted and re-enacted and put on trial with other product qualities in the different part of the same process in one or few locations.

Identifying different ways of enacting environmental friendliness and (de)stabilizing it lead to grouping together similar enactments or modalities of stabilization or destabilization. Here commonalities and divergences started to emerge in the materials in a more systematic manner. In the parts dealing with the efforts carried out in the public arena and product development and marketing, this way of dealing with the field materials and the empirical accounts, however, sometimes clashed with my aim of telling a story of a process and highlighting the possible dynamics that fold out over time. Similar enactments and processes of (de)stabilization often occurred in different points of time which made it difficult to both tell a chronological story of a process, and focus on the differences and similarities in the enactments and stabilization and destabilization processes. I did not find one best way to reconcile these aims, and did therefore sometimes decide to break the chronological account, sometimes not. Finally, I addressed the interdependencies between enactments and modalities of (de)stabilizing across different parts of the process and different locations.

### 3.4. Constructed knowledge – good knowledge?

This study is a constructivist study as already mentioned in the previous chapter. The constructivist position implies that all knowledge, including scientific knowledge, is constructed. And even more so, the knowledge is co-constructed in the relation between the researcher and her object of study. From this co-constructed nature of knowledge follows that pure representations of the object of inquiry do not exist. Indeed, Latour (1999) abandons the idea of an isolated and singular mind looking at an outside world and trying to extract certainty from it (Latour 1999: 296). Objective statements of the outside world do not exist as there is neither outside nor inside.

If an accuracy of reference is dismissed as a golden standard for good scientific work, what becomes of research? There has been a number of attempts to define criteria for good research or knowledge that are not based on the idea of a subject in here producing objective and representational information about what is in the world out there. According to Latour (2004), the key lies in the qualities of the

relationship between the researcher and her topic of inquiry. Referring to the work of Strengers and Despret, Latour (2004) suggests that three minimal conditions of scientificity are as follows: an interested scientist, interested elements under study and interesting articulations of the topic of interest by the scientist (Latour 2004: 218). This might sound easy, but it is not. In Latour's words: "Good science is rare and when it occurs it is an event that should be cherished like a miracle, commented on and disseminated like a work of art" (Latour 2004: 223). In the following, I will elaborate on these three criteria in relation to my own research.

### **On being interested**

An interested scientist and an interested topic of inquiry go hand in hand. For Latour, a scientist who is not interested approaches the world without wanting to hear its story but wanting to hear her own voice. Rather, what a researcher should strive for is to learn to be affected by and resonate with her objects of study (Latour 2004: 210). Leaning on Strengers, Latour suggests some "techniques" that enhance the engagement of the researcher and the topic of inquiry with each other. The researcher ought to be prepared and willing to reassess the appropriateness of her research questions by opening up for friction from the entities she follows. She ought to be asking: "Am I asking the right questions?" Furthermore, she should device her inquiries in a way that best brings up the recalcitrance of those that participate as well as provide occasions where it is possible for them to raise their own questions against the original intentions of the investigator and answer with their own categories rather than the researchers (Latour 2004: 216-19).

These ways of engaging with the object of inquiry are ways to strengthen an anti-essentialist position and the principle of generalized symmetry when conducting research.<sup>14</sup> Following from the anti-essentialist position, no distinctions of the object of study should be anticipated a priori. According to the principle of generalized symmetry, these distinctions are matters of empirical observations, they might occur in the object of study, but they cannot be approached as an essential feature of this object. If any distinctions and divides exist, they should be approached as an outcome rather than an inherent quality of the world (Callon 1986, Latour 2005, Law 1999: 3). The interesting thing about employing a symmetric point of departure is that it allows for asymmetric outcomes (Kjellberg

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<sup>14</sup> The principle of generalized symmetry reveals ANT's relation to the French semiotic tradition, which is also openly advocated by both Latour and Callon.

2001: 43). The above mentioned techniques enable the researcher to come into terms with the distinctions she might be imposing on her object of inquiry.

The principle of generalized symmetry indicates a profound impartiality as to whatever actors are involved in the world studied. Therefore, the only way to understand what the object of study consists of is to follow the actors (Callon 1986: 201, Latour 1987). By far the most discussed implication of this approach has been the extension of the symmetrical treatment from humans to non-humans in ANT (i.e. Latour 1991, Latour 2005: 71-72) which has led to characterizing ANT as a non-humanist or post-humanist position. According to ANT, there is no reason to a priori allocate different roles to non-human and human actors. Again, the type of agency of each actor is a matter of empirical definition, not theoretical (Law 1999: 4).<sup>15</sup>

Furthermore, based on the principle of generalized symmetry, no predefinable way exists to shape and organize relations between different actors (Law 1999: 8). This is also why ANT is deeply sceptical about the size and scale of actors – yet another dimension where the constructivist position differs from many forms of social constructivist understandings about the world. ANT scholars have on several occasions argued against a micro-macro level distinction (Callon and Latour 1981: 299, Latour 1999, Latour 2005). The problem in leaning on macro-level explanations is that they easily blind the eye of the researcher from the work that constitutes a particular local order. Furthermore, explaining a particular phenomena by i.e. social norms or physical laws lead the focus away from what should be investigated, namely how it is that a particular meaning becomes a norm or acts like a norm in a given situation.

To reiterate, being interested means approaching the object of inquiry with the principle of generalized symmetry in mind. This enables the researcher to engage with her object of study in a non-deterministic, anti-essentialist manner which allows for mutual resonations between the two. Actors in the empirical setting define each other, what they do and their relation to each other. Furthermore, to follow the actors also means to be corrected by them, to be attentive to the

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<sup>15</sup> This is one of the dimensions that make the constructionist position differ from that of the social constructivist (see i.e. Latour 2005). From an ANT point of view, social constructivism could thus be called a social reductionist position.

friction and objections from their side – and even create situations where these objections can be articulated.

In my study, the principle of generalized symmetry has meant that I have opened up for an empirical definition of what is enacted as environmental friendliness, how the distinction between environmentally friendly and harmful is established and who and what participates in this activity of defining and enacting.

Furthermore, I have not a priori attempted to define how particular enactments of environmental friendliness are related to other product qualities in different settings where qualification work is carried out. As accounted for in the previous parts of this chapter, I have gradually learned where the qualities of urine bags are constructed and coordinated with each other, and followed my actors to these locations. Similarly, the constellation of actors attending to the work of qualification has been empirically defined.

My engagement with my topic of inquiry has not meant a passive following of my actors, a position which is neither possible nor something a researcher should aim for. I have tried to enhance my understanding of the actors and their relations by intervening in their lives and by posing questions. I have, however, not taken the position of an expert, but rather have let them tell me what their practices are about, what the issues are that they attend to no matter what their relation to environmental friendliness has been. Many of my interview persons have received written accounts that I have reconstructed of their practices based on interviews and other available field material. I have received comments and corrections to these, yet the overall reaction from my interview persons has been that of recognition. Furthermore, I have tested my reading of my field materials by discussing this with other researchers – sometimes they have been able to challenge my analysis of the field material and point out my areas of ignorance.

### **On being interested in markets**

The constructivist position on markets implies that markets are seen as shaped in situated practices which might very well differ drastically from each other (see i.e. Callon and Muniesa 2005). This applies to products and their qualities as well. Construction of product qualities and the qualification of a product is a chain of local, sometimes related practices where market actors and objects of exchange

both participate and become enacted.<sup>16</sup> The constitutiveness of local practices for the phenomenon under study has profound implications on what it means to be interested in markets, what it means to follow the actors and what it means to be interested in them. Let me elaborate on this as follows.

So, markets and urine bags, like other things, become what they are as a result of local enactments (cf. Mol 2002: 30-33). What an object is is a question of how it is defined in each different practice where it might get enacted (Mol 2002: 55). It follows from this that different enactments of an object might exist. These enactments present neither a different side of the same object, nor do they present objects totally foreign to each other. We can talk of different yet overlapping objects (Law 2004, Mol 2002: 55). This implies that objects, indeed, have a variable (Latour 1996: 173) or multiple (Mol 2002: 157) ontology. Depending on their enactments, then, objects can be, and often are, multiple. Different enactments or performances of an object do not necessarily exclude each other but can exist side by side (Mol 2002: 43-85). To return to the subject of inquiry, under the assumption that markets are constituted in different locations, being interested in the role of environmental friendliness in the construction of markets for a product suddenly potentially multiplies the object of study. Now we ask: what roles do the different enactments of environmental friendliness play in different market constituting practices – if any? And what happens if these different enactments and different roles meet?

In order to approach the suggested multiplicity of environmental friendliness and its roles enacted locally in many different locations, a method is needed that does not seek general conclusions but rather works specifically, location by location (cf. Law 2004: 153). Mol suggests that a focus on objects enacted in practices calls for research that foregrounds the practices in which the objects are handled. It is through this kind of method that the objects multiply rather than become bracketed (Mol 2002: 5). Mol (2002) calls these practice focused inquiries praxiographies (Mol 2002: 31). Law's and Mol's understanding of an appropriate method resonate very well with that of Latour's. According to him, being interested requires a research methodology that varies according to the topic of inquiry, a methodology that allows for this following of an object that might take an unexpected route. Indeed, there is no all-around method for knowing (Latour 2004: 214); the method

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<sup>16</sup> Here it is important to note that products, indeed, are seen as important participants in this construction of qualities: qualities are both intrinsic and extrinsic to the product (Callon and Muniesa 2005: 199).

has to be tailored to enable the researcher to become affected and engaged with her object of study. According to Jensen and Lauritsen (2005), precisely because knowledge is always generated through specific relations, no general method can claim universal validity (Jensen and Lauritsen 2005: 68).

I have taken Latour's, Law's and Mol's thoughts aboard and oriented my research towards locally produced enactments and local practices. However, there have been two issues that have been challenging in this respect: time and the amount of locations. Ideally, praxiographies would be conducted in real time. There are several reasons why this has not been possible for me. On one hand, my topic of inquiry is not limited time wise. Rather, to investigate market construction, one has to allow time to pass. In my case, the process already started well before I started my study. Furthermore, as noted above, markets are constructed in multiple locations which makes it practically impossible for a researcher to be present in all. I have tried to overcome these challenges of time and space wise distribution of market constitutive practices by attempting to reconstruct practices in different locations. In practices like product development, marketing, procurement and needs appraisal this has been relatively easy. However, it is not only in these practices where the significance of environmental friendliness of urine bags is constructed. Due to time constraints, then, I have been unable to study in detail those local practices where knowledge about harmful materials is constructed and those where the possible regulative efforts and voluntary initiatives to deal with the claimed harmfulness is at stake. Rather, I have concentrated on the traces those practices have left which have been able to tell me where the distinction between environmental friendliness and harmfulness has been placed. Furthermore, I have looked into what has been produced in these practices – besides the distinctions – tools, technologies, legislation and so forth that could have influenced the ways in which the practices around buying, selling and producing urine bags have evolved.

In my study, besides taking me to various locations, the principle of variable ontology has been significant in terms of ordering my approach to the situations where the product qualities, inclusive environmental friendliness, are negotiated and coordinated with each other. As noted previously, I have approached environmental friendliness and its role in the process of qualification as an empirically open question. Furthermore, rather than assuming that there is only one mode of enacting environmental friendliness, I have celebrated the possibilities of different enactments as well as non-enactments. However, in situations where

environmental friendliness has not been considered a product quality by the participants, I have taken a stance according to which environmental friendliness *could* have been a possible quality, and investigated possible reasons for it not becoming one.

### **On producing an interesting articulation**

According to Latour (2004), again, the outcome of a scientific inquiry should be interesting, not redundant and a simple tautology of already given descriptions and explanations. Sciences should add to the world, not limit it (Latour 2004: 225). An interesting, good articulation is something that makes a difference. There should be "distance between the new repertoire of actions and the repertoire with which we started" (Latour 2004: 219).

There are certainly many ways to add to the world, but if we take Latour's previous advice of being interested seriously, the contribution a researcher can make is very closely related to her ability to engage with her topic of study. If his advice of being interested and thereby being affected by the topic of study have been followed all the way through from the co-construction of field materials to the analysis, the threat of tautology can hardly become real. The research, almost certainly, adds more contrast to the very world we live in. I have, until now, clarified how I have attempted to concoct the study in a way where the engagement with my object of study has allowed for resonance. Whether the results of these engagements are sufficient to suggest that this study has added something to the world is up to the reader to judge.

Related to the ability of the research to contribute to this world by adding contrast and new action, I wish to discuss the question of generalizability. In the realm of case-studies, generalizability is often attributed to case selection (see i.e. Flyvbjerg 2004, Silverman 2005, Stake 2000). I spent quite some time thinking about what kind of case I should work with in order to be able to produce generalizable knowledge about the markets for environmentally friendlier products. My conclusion, however, was that without knowing the case or the field in advance, it was impossible to tell what the case would be about, let alone to select a case that could provide generalizations. Furthermore, my theoretical position stressed the world – and markets – as emergent and contingent of local performances and enactments. This position makes it very difficult to a priori assume mechanical similarities between separate practices. Rather, the existence of similarities is an



empirical question. In my position, then, selecting a "right" case would not have secured generalizability.

Latour's (2004) position on generalization starts from a rather different point than that of Flyvbjerg's, Silverman's and Stake's. He states that generalization is possible, but a good generalization is a delicate thing. Again leaning on Strengers and Despert, a bad generalization eliminates alternative versions of the world and discounts all the remaining differences as irrelevant. A good generalization, on the contrary, allows for recognition of unexpected differences (Latour 2004: 220-21). Generalizability of a case does thus not necessarily depend on how the case was chosen, but on what kind of articulations it allows, on whether it allows for "maximizing of articulations". And as we have learned, these articulations are very much dependent on how the case study is conducted.

This study does not suggest that there are general law-like mechanisms that always make environmental friendliness acquire the same form and the same weight in different market constitutive practices. This, however, does not by any means undermine the importance of the case study at hand in terms of understanding markets for products that can be enacted as environmentally friendlier than their competitors. As Flyvbjerg (2004) notes, and here I follow him, a case study produces context-dependent knowledge that enables learning and moving from rule-governed use of analytic rationality of the beginners to the fluid performance of tacit skills (Flyvbjerg 2004: 421). In particular, I believe that practitioners and other researchers will find the detailed knowledge produced in this case study helpful for their reflections in the field of assistive devices, public procurement and health care. The generalizations I have attempted to make in the end of this study celebrate the multiplicity of the enactments of environmental friendliness in different locations. In this way, leaning on detailed descriptions and vaguer kind of generalizations, this study does allow, and indeed invites differing accounts and articulations of the world to arise.



# 4. ENVIRONMENTAL FRIENDLINESS AND DRAINAGE BAGS IN THE PUBLIC ARENA

Markets for environmentally friendlier products can be shaped by actors in many different arenas that might overlap. This chapter will focus on the activities and the debates related to environmental friendliness and urine bags in the public arena. Although these might not directly deal with buying or selling urine bags, they sometimes nevertheless participate in settling or stabilizing the qualities of these devices. Political debates, regulative measures, voluntary agreements, scientific investigations and product and technology development projects that have attracted public attention are investigated in terms of their influence on the markets for environmentally friendlier drainage bags. One of the aims of this chapter is to clarify how and what kind of governmental and voluntary regulative measures that might stabilize the role of environmental friendliness in market transactions are formed in the public arena. An example of this kind of measure could be a voluntary agreement on outphasing PVC products in the medical devices industry. Another aim of this chapter is to gain insight into different discussions and measures that might have an influence on the market transactions in other and more subtle ways. For example, a publicly financed and reported material development project might act as for the industry to start using more environmentally friendlier materials.<sup>17</sup>

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<sup>17</sup>It is not my aim in this chapter to present politics and regulation as macro-actors (Callon and Latour 1981: 284, 285) that from a distance define the form and the role environmental friendliness comes to play in the relationships between buyers, customers and products. Rather, the size and shape of these will be an object of an open inquiry which starts in this chapter and continues in the following chapters on production, buying and use of urine bags.

This chapter starts by investigating how environmental friendliness is enacted in relation to urine bags in political programmes, research and green public procurement initiatives. As we come to see, environmental concerns related to drainage bags become closely connected to the material that most drainage bags are made of, polyvinylchloride – also known as PVC. Environmental impacts of PVC are enacted in various different ways throughout the years. Attempts to influence market transactions in a way that stabilizes environmental friendliness as a product quality for drainage bags specifically are, however, rare. Contrary to this, many debates and measures focus on the environmental concerns related to PVC in general. PVC as a material is reframed again and again in relation to its environmental harmfulness as solutions to different environmental problems emerge and a possible inclusion of overflows presented by these problems seems to become possible (cf. Callon 1998a: 258). At times, as will be shown, these discussions, attempts and measures also have an effect on how particular forms of environmental friendliness become stabilized in relation to particular product areas, including urine bags. This chapter thus investigates how differently enacted environmental impacts of PVC are dealt with in general in the public sphere – and how these discussions and measures regarding PVC might influence the qualification (Callon et al. 2002) of urine bags.

## 4.1. Drainage bags and the environment

Urine bags as a product group have only attracted very limited attention in the public discussions on the environmental concerns related to products. This is hardly surprising: only very few single product groups are discussed extensively in the public arena in relation to their possible environmental impacts. Urine bags are a product used by very few people – and problems related to bodily fluids and faeces are often treated as a taboo. Little as it might be, medical devices as a generic product group and even urine bags specifically have actually been mentioned in relation to the environment in some debates and have been a theme in a few initiatives. Most prominently, the environmental concerns related to medical devices have been discussed in relation to green public procurement, PVC substitution in general and in relation to phthalates.

Green public procurement is a concept that started to appear in governmental reports and policies in Denmark in the early 1990s (Toft and Dall 1992). The discussion on green public procurement includes defining and evaluating the environmental impacts of public procurement and developing tools for greening the public purchases. In the health care sector, however, the green public procurement discussion seems to have taken off rather slowly. According to a DEPA report, environment had not been an issue in the hospital sector in the early 1990s: there had only been a handful of initiatives in some hospitals (Carl Bro and Dansk Sygehus Institut 1992). This is for example indicated by the fact that by 1994, Sinerfa, a working group for hospital procurement staff in the counties established in 1991, had not dealt with environmental issues regarding hospital procurement (Dansk Sygehus Institut and Carl Bro 1994).

In green procurement status reports and political action plans, medical devices, assistive devices and health care and hospital products have been grouped together as a focus or possible focus area in municipalities and regions (i.e. Sørensen et al. 2000: 25, Toft and Dall 1993: 30, Eikard et al. 1993: 29, Ministry for Environment and Energy 1995, Kommunernes Landsforening et al. 1999: 30, Sørensen et al. 2000: 25). The reports or political programmes mentioning these product groups do not normally articulate exactly what environmental impacts are perceived as most crucial. However, a report on public green procurement policy from 1993 stated that the most relevant issue in relation to care and hygiene products, including urine bags, was the substitution of PVC (Offentlig grøn indkøbspolitik 1993: 59). Likewise, a handful of other reports on green public procurement and clean technology mention PVC substitution or PVC-free purchasing as issues either to be promoted within health care or as something that already has received attention in some municipalities (Carl Bro and Dansk Sygehus Institut 1992, Weidling et al. 1992: 95, Sørensen et al. 2000: 25).

Although the debate on green public procurement in general has produced a great number of both generic and product group specific procurement tools, hardly any of these have focused on assistive technologies or hospital or health care products. A tool for green public procurement that is often referred to in different reports, is Grenå municipality's procurement guidelines for hospitals on PVC-free products, including urine bags, in the county of Århus from 1991 (for example in Århus

Amtskommune 1991, Toft and Dall 1993: 30).<sup>18</sup> In the early years of the 21<sup>st</sup> century, SINERFA and the Medicoindustrien, a trade organization for the medical devices industry, prepared a data sheet (Appendix IV) on the environmental qualities of medical devices as a generic product group for use in public procurement of medical devices. The form includes questions on materials used in the product, whether PVC is used and to what extent, what plasticizers are used if PVC and the percentage of them in PVC. Furthermore, information on heavy metals, chlorine and other unwanted substances, recycled materials, packaging materials, eco-labels and environmental certifications of the production systems, durability and right storage and disposal are requested. The SINERFA data sheet thereby provides a broad base for enactment of environmental impacts related to all medical devices, not only or specifically urine bags.

The measures, initiatives and investigations related to green public procurement seem to enact PVC as equal to environmental harmfulness in medical devices and hereunder urine bags. Environmental friendliness is further enacted as PVC-freeness also in connection to a wider PVC-substitution effort covering many product areas, including medical devices and thereby urine bags. In relation to PVC-substitution, two projects mapping the possibilities of PVC substitution in urine bags and medical tubes (Jysk Teknologisk 1987: 6-7, Dansk Teknologisk Institut 1991) were carried out. Another project with the aim of developing a urine bag made of alternative materials was also carried out (Jørgensen and Høier 1995: 21).

Event though the environmental concerns related to urine bags specifically have not received a great amount of public attention, it is quite clear that the environmental concerns in the public realm have mostly been related to the traditional production material of the urine bags, PVC. PVC-substitution as an attempt to clean out environmental impacts related to medical devices was particularly in focus in the early 1990s. However, in the past years, attention has increasingly been shifted to phthalate plasticizers in medical devices made of PVC (i.e. Miljø- og Energiministeriet 1999b, EU's videnskabelige komité for medicin og medicinsk udstyr 2002, Karbæk 2003, SCENIHR 2007: 45). Again, urine bags are dealt with as a part of a larger group of medical devices. Regarding medical devices, however, environmental concerns are not articulated as the main risk

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<sup>18</sup>These guidelines were republished and revised several times, for example in 1997, when Århus County published them in a guidebook on PVC-free procurement including hospital products.

related to these plasticizers – rather, phthalates are articulated as problematic based on their possible direct adverse impacts, i.e. reprotoxic effects, on the user of a PVC medical device. Thus, even though focus has been kept on PVC or one of the substances used in it, it has nevertheless shifted from *environment* to *health impacts*. Also phthalate related measures will be discussed in more detail later on in this chapter.

As shown above, only little discussion and few initiatives related to the environmental impacts of urine bags are to be found in the public arena. Problematizing the use of PVC in medical devices is, however, part of a wider evolvment regarding PVC use in general. The framing of PVC as a material with great benefits for basically any type of use is problematized in the public realm by making the environmental concerns overflow this frame. This problematization relates the PVC substitution discussion to the urine bag product group, amongst others. Indeed, the above mentioned PVC substitution is but one of the ways of dealing with the overflows in the framing of PVC. Different measures are discussed and undertaken in order to either eliminate PVC or reframe it in such ways that overflows are internalized and no environmental problems prevail to problematize PVC as a product material. The rest of this chapter will investigate how these diverse efforts, including substitution of PVC, emerge within the public realm and how they contribute to shaping the use of PVC and thereby the work on qualification of urine bags. Furthermore, the ramifications of the framing and reframing of PVC in the public arena on stabilizing PVC-freeness as environmental friendliness in the realm of drainage bags are discussed.

## 4.2. Environment and PVC

PVC has been praised for its functionality and formability. However, in the course of the past decades it has also come to be seen as a source of adverse environmental and health related effects. These concerns have presented a possible overflow to the frame for approaching PVC as a usable plastic material. From the 1970s until today, PVC and its environmental effects have been a topic of different types of anticipated and realized political measures and cooperative projects with

the industry using PVC, researchers and municipalities in Denmark – and in other countries and the EU.<sup>19,20</sup>

In Denmark, environmental concerns related to PVC were first raised in relation to an application for permission to build a PVC-production plant in Denmark and its denial in the 1970s.<sup>21</sup> After this, the environmental impacts of PVC have been discussed mainly in relation to PVC material and have been linked to the chlorine content of PVC, phthalate plasticizers and heavy metal stabilisers. The chlorine content of PVC (around 57%) has been suggested to contribute to dioxin and hydrochloride acid emissions upon incineration of PVC waste leading to possible carcinogenic and hormone disruptive impacts<sup>22</sup> as well as acidification. Phthalates have been discussed for their possible hormone disruptive impacts on both humans and animals and for their toxicity for aquatic environments amongst other issues (see i.e. EU risk assessments on various phthalates). Heavy metals like lead and cadmium are shown to be toxic for both humans and animals and their accumulation can cause serious illnesses. The possible health related impacts of PVC have been closely interlinked with the contamination of the living environment, food and water.

In the following, I will discuss the problematization of PVC in regard to its perceived environmental impacts and the measures related to dealing with the overflows in the framing of PVC in Denmark.<sup>23</sup> Perceiving PVC as harmful to the environment and human beings has led to questioning the necessity of using PVC as well as attempts to bring PVC into balance with the environment. I suggest that problematization of PVC in relation to its articulated environmental impacts has led to a) efforts to substitute PVC and thereby profoundly reformat the qualification of urine bags, and b) attempts to reframe PVC as environmentally

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<sup>19</sup> In 2000, the European Commission published a Green Paper on PVC assessing the various environmental and health issues related to PVC (Commisson of the European Communities 2000). In June 2004, the EU Commission published a compilation of available life cycle assessments of PVC (Baitz 2004).

<sup>20</sup> Dioxins are also one of the issues covered by the Stockholm Convention from 2001 on persistent organic pollutants (POPs).

<sup>21</sup> The building permission for this plant was denied on environmental grounds (Auken 1999).

<sup>22</sup> See i.e. <http://www.mst.dk/Kemikalier/Fokus+paa+saerlige+stoffer/Dioxin/>.

<sup>23</sup> In Denmark, no production of PVC is carried out. This is probably also the reason why the environmental concerns related to PVC production have not been discussed to a great extent since the 1970s when establishment of a possible production plant was debated. The attempts to problematize the use of PVC in products have mainly taken place later on. Here, the focus is in these attempts.



neutral. These attempts have appeared in different forms but have nevertheless circulated around the same topic: inclusion of the environmental overflows in the framing of PVC. Indeed, as we come to see, dealing with the hazardous overflows has led to a series of situations that Callon (1998a: 260-61) would call hot: they have included identifying overflows and negotiating the roles and interests of different actors involved. These different ways of including environmental overflows in the framing of PVC have been partly interdependent and time wise overlapping. Some of these attempts have or have had a potential to (partially) destabilize the enactment of PVC as environmentally harmful in the realm of urine bags which, in turn, might have influenced the qualification of urine bags. In the following, I will discuss the attempts to substitute and neutralize PVC.

#### 4.2.1. Substituting PVC

Among the first reactions to the overflow in the framing of PVC were the attempts to eliminate PVC from the group of materials used in plastic products and thereby reframe the use of PVC in Denmark. Bill proposal (B90) on standardization of plastic packaging leading to an outphasing of PVC was raised in the Danish Parliament in 1985 (Holmsgaard et al. 1985). The bill proposal (B90) did not lead to an outphasing of PVC but was approved as a decision about development of non-harmful packaging (Galamba 1997: 59). In the spring of 1987, a legislative proposal (Christensen 1987) on banning PVC in packaging from 1989 onwards, a very similar proposal to the B90 bill from 1985, was submitted by some members of the Danish Parliament. The bill was not approved, but the minister of the Environment, Christian Christensen (Christian People's Party), informed the Environment and planning committee in the Parliament that he had instructed DEPA to start negotiations with the Federation of Plastic Producers (Plast-Sammenslutningen) and other relevant partners in order to reach a voluntary agreement on the substitution of PVC in those areas where it was possible (Christensen 1987).

Linked to the substitution idea, a number of projects were initiated in order to map the possibilities of replacing PVC with a less harmful material (Jørgensen and Høier 2005: 7, Nielsen et al. 2003: 13). The aim was to develop processes and to test alternative materials in certain sectors (Jørgensen and Høier 2005: 14). These activities were carried out under a common umbrella that was later named the PVC

programme of action (PVC-handlingsplanen)(Jørgensen and Høier 2005: 7-8). In 1987, four investigations were carried out in order to map the use of PVC and alternatives for substitution within building, packaging and other areas of use, including hospital devices (Christiansen et al. 1990, Hillersborg and Ottosen 1990, COWIconsult 1990, Bager et al.1990 and Jørgensen and Høier 1995: 14-15). The four projects were based on a previous project, an evaluation of PVC from 1987, Substitution of PVC with other plastic materials (Jysk Teknologisk 1987).

The substitution efforts were also supported by the next Minister of Environment, Lone Dybkjær (Danish Social-liberal Party). In 1988, she issued ambitious plans on phasing out PVC, and, in the end, banning the material. In 1988, the Minister of Environment, in her letter to the Environment and planning committee in the Parliament, presented targets for the negotiations with different partners as follows (Lone Dybkjær 1988):

”It is my understanding that the objective for the forthcoming negotiations should be a total substitution. The aim is therefore that the result of the further investigations from around 1989-1990 will serve as a base for negotiations between EPA and the relevant partners on a plan for outphasing PVC. The aim of the plan is to achieve a 50% voluntary reduction by 1992 and a total outphasing soon thereafter.

Should the branch not agree with this goal by 1<sup>st</sup> October 1990, a principal ban on sale and use of PVC will step into force in 1993.”  
(Translated from Danish by author)

The minister of Environment stated that she would reissue the negotiations after investigations in PVC use, environmental impacts and effects of an eventual substitution would be finalized (Lone Dybkjær 1988).

By 1988, diverse scientific investigations had made environmental and health impacts of PVC calculable and visible as an overflow, as a consequence of which substitution and even outphasing of PVC was discussed. Out-phasing of PVC would not only mean getting rid of the environmentally problematic overflows in relation to PVC but also presented a new frame for the use and production of PVC. The logic in this frame was simple and forceful: Through regulative or voluntary outphasing of PVC, the production and use of PVC would be made impossible.

Within the new frame, PVC-freeness could be seen as an obligatory passage point (Callon 1986: 202-3) for every enterprise either producing plastic products or using them. With its over-arching power, a regulatory ban or outphasing of PVC would produce reconfigured enterprises dealing with PVC-free plastics as their only possible choice.

Furthermore, anticipated regulatory change created a vision of a future market that excluded PVC products. Thus, the product that would qualify at that market ought to possess a quality: PVC-freeness. If accepted, the outphasing of PVC would work as a closure mechanism (Holm and Nielsen 2007: 177) reformatting the markets for plastic products previously made of PVC. As for medical devices including urine bags, a possible ban on PVC would profoundly reformat the landscape for producing – and therefore also selling and using – devices that now consisted of PCV. The outphasing would stabilize the role environmental friendliness in a form of PVC-freeness would play in the market.<sup>24</sup>

### **The competitiveness of the Danish industry privileged over substitution of PVC**

Plans to outphase PVC were criticized already in the very preliminary phase of the negotiations. According to the memo from the Minister for the Environment, the industry saw PVC substitution as a threat. According to the industry, their competitiveness in the Danish market would suffer as export products would not be included in the agreement (Lone Dybkjær 1988: 7):

”Some organizations think that the Danish industry will be put in an unfavourable situation in relation to their trade and competitiveness as a result of an isolated Danish substitution, because it will not be possible to restrict import of PVC-products.” (Translated from Danish by author)

The possibilities of PVC substitution in drainage bags had to a certain extent been explored in a number of government subsidized projects under the PVC Programme of Action and the Programme for Cleaner Technology. Some of the

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<sup>24</sup> As we come to see, the idea of outphasing PVC did not travel far. However, yet another bill proposal on outphasing of PVC was proposed in 1996 (Gade et al. 1996). In reaction to this, the Minister of Environment and Energy stated that there would be a status report on PVC available in 1997-1998 (Miljø- og Planlægningsudvalget 1996).

development projects were carried out by enterprises or had involvement from the plastics industry and showed that PVC free products would often make a higher product price in relation to the conventional bags. Two projects regarding PVC substitution in hospital devices were carried out under a common umbrella that was later named the PVC programme of action (PVC-handlingsplanen). One of the projects mapped the use of PVC and alternatives for substitution within hospital devices, including urine bags. According to the published report, it had not been possible to find suitable materials that could substitute either the folio or the tube for urine bags. It was also estimated that for urine bags, possible alternative materials would be at least five times more expensive than PVC (Hillersborg and Ottosen 1990: 83-87). PVC-free tubes were also tested in another project. It was concluded that tubes made of alternative materials would cost 530-630% more than the PVC tubes which was not considered economically viable. Interesting alternative materials were found which, however, would require further development in order to be used in products that require non-kink qualities (Dansk Teknologisk Institut 1991: 4-6).<sup>25</sup>

As part of the Programme for Cleaner Technology in the Council of Clean Technology (Rådet vedrørende genanvendelse og mindre forurenende teknologi), a Danish producer of medical devices, Coloplast, received some financing for developing a product and product materials for a PVC-free urine bag (1990-1991) and a PVDC-free colostomy bag (1991-1994). According to the evaluation report on the Programme for Cleaner Technology from 1995, it had, indeed, been possible to produce a urine bag that was developed and sold. However, the price of the product had turned out more expensive than expected due to investments in production machines and a more expensive plastic material (Jørgensen and Høier 1995: 21-22).

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<sup>25</sup> The medical devices industry has later argued that there are also other than price reasons for not being able to substitute PVC in all medical devices. In 1997, The Danish Medical Devices Association published a brochure, PVC in the Health Care Sector (Dansk Forening for Medicinsk Udstyr 1997) where PVC was presented as the only material that could live up to the requirements for medical devices (Dansk Forening for Medicinsk Udstyr 1997). In its environmental report from 1997, Coloplast, one of the enterprises who received financing for the development of PVC-free products and succeeded in producing and launching a PVC-free urine bag, approached the PVC-discussion. According to the environmental report, 'the material is often the only accessible material which can fulfil the strict criteria for security and functionality that are required for medical equipment' (Translated from Danish by author). Coloplast furthermore states, that substitution of PVC often means that the products become more expensive and possibly acquire worse qualities in terms of use and environment and thus become non-usable (Coloplast 1997: 7).

The issue of competitiveness was also discussed in one of the working reports of the development projects. It was anticipated that restrictions on the use of PVC in urine bags could lead to a situation where the Danish producers would leave the Danish markets (Hillersborg and Ottosen 1990: 87):

”A restriction in the use of PVC in Denmark could mean that the producers leave the Danish market, partly because it is seen as too small to cover the costs of developing an alternative product and partly because it constitutes a small part of the turnover.” (Translated from Danish by author)

Similar voices were also raised in the media (see i.e. Ingeniøren 1989). However, it was also assessed that the competitive potential of the Danish enterprises would benefit from being able to provide other markets with products made of alternative materials (Hillersborg and Ottosen 1990: 87).

By presenting a plan to outphase PVC, the Minister of Environment had opened up a discussion on the consequences of changing the basis for using PVC in products. Making environmental consequences part of the frame for the use and production of PVC-free products in Denmark by a total outphasing of PVC produced other overflows in the market calculations. As the PVC using industry in Denmark pointed out, outright banning of the use of PVC would not remove PVC from the imported products and would thus create a market where some of the products in the same product group were allowed to contain PVC while others would not. During the government financed product development projects, it had not been possible, according to the enterprises, to produce similarly priced PVC-free products in all product categories. This, according to the industry, would have a possible negative influence on the competitiveness of Danish products and producers.

### **Dioxin emissions contested**

Besides competitiveness, another issue challenging the plans to outphase PVC was the contested importance of dioxin<sup>26</sup> as a perceived problem in general and in

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<sup>26</sup> Dioxins are a group of tri-cyclic, halogenated, organic compounds classified as polychlorinated dibenzodioxins and polychlorinated dibenzofuranas (Hansen 2000: 17). Dioxins as something

relation to PVC waste incineration specifically. Dioxins had since long been known to have adverse effects for the environment. Furthermore, dioxins were assumed to have health related impacts and the substances could reach human beings through pollution of their living environment, food and water (see i.e. Miljøstyrelsen 1984c: 1, 13-14).

The previous research on the amount of dioxin emissions of waste incineration was challenged by other research including Dioxin Emissions in Waste Incineration (Miljøstyrelsen 1989). This report estimated the annual dioxin emissions from Danish plants to be around 50 g Seveso-dioxin whereas the report from 1984 had presented an estimation of about 1.6-3.2 kilograms of Seveso-dioxin annually (Miljøstyrelsen 1984c: 6, Miljøstyrelsen 1989: 9). Part of the deviance could be explained by the development in incineration plants. Inclusion of waste incineration plants under the environmental permission act had sharpened conditions under which it had been possible to burn waste (Galamba 1997: 5).<sup>27</sup>

Also, the role of PVC in the formation of dioxins in waste incineration was a contested topic. According to Jørgensen and Højer (1995), in the end of the 1980s, the concern for the environmental impacts of PVC were focused mainly on the chloride content of PVC as this could possibly affect the dioxin content in waste incineration emissions. The focus on dioxin in the PVC debate is clearly present in the Minister of Environment, Lone Dybkjær's comment regarding the environmental concerns related to PVC (Dybkjær 1988):

”The risk of dioxin production is the most important environmental argument for initiatives to reduce the use of PVC... Waste incineration still has to be seen as one of the biggest – and probably the biggest – source of dioxin pollution in Denmark.” (Translated from Danish by author)

However, there was no consensus about the scientific base for concluding that dioxins were a result of burning PVC. A DEPA report from 1984 featured

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problematic became an issue in the media for the first time in relation to the massive SEVESO chemical accident in Italy in the 1970s. In 1977, the Danish Environmental Protection Agency (DEPA) published a preliminary rapport on dioxins in Denmark.

<sup>27</sup> Since 1985, waste incineration plants – also those burning special hospital waste since 1991 – had been regulated specifically by an environmental permission system in order to bring down their emissions (Miljøministeriet 1985, 1987, 1991 and Miljøstyrelsen 1993)

difficulties in measuring and estimating the dioxin emissions from Danish waste incineration plants. Moreover, experiments on reducing PVC waste in burned waste did not seem to reduce the amount of dioxin produced as long as the burned material included other materials with chloride content (Miljøstyrelsen 1984c: 24). In another DEPA report (DK-Teknik and Danmarks Miljøundersøgelser 1989), the amount of PVC seemed to correlate positively with dioxin and chloride acid emissions from waste incineration (DK-Teknik and Danmarks Miljøundersøgelser: 5).

After the substitution plans presented by the Minister of Environment in 1988, further experiments were made – again with contradictive results. For example, in investigations carried out between 1990 and 1992, it was not possible to show a reduction of dioxin emissions even when waste with PVC content was removed. However, this was thought to depend on not having been able to remove all the PVC from the waste (Jensen et al. 1995: 130). The controversy about the role of PVC in the emergence of dioxin emissions featured difficulties in enrolling PVC and dioxin in any of the translations (Callon 1986) of the situation.

Besides the contradictory results from the research regarding the relation between dioxin emissions and the chloride content of the fed waste, the relation between dioxin emissions and PVC in waste incineration was also challenged by results of experiments on operating conditions in 1989 and later on in 1996. These experiments showed a remarkable dependence between operating conditions, especially combustion temperature, flue gas temperature and content of carbon monoxide, and dioxin emissions (Miljøstyrelsen 1984c, Miljøstyrelsen 1989: 5, Dam-Johansen and Jensen 1996: 9).

According to Jørgensen and Højer (1995), it was this very conflict between the results from different investigations estimating the role of PVC waste in the dioxin emissions for waste incineration that led to a calming down of the dioxin discussion in Denmark (Jørgensen and Høier 1995: 11). The conflicting results thus contributed to the decline of the importance of removing all PVC from incinerations at once through an ultimate action, a ban.

## 4.2.2. Avoiding making PVC harmful

In May 1990, negotiations between different actors for a voluntary agreement on dealing with PVC were reissued (Nielsen et al. 2003: 18, Jørgensen and Høier 1995: 9). In April 1991, an Agreement Regarding the Use of PVC was issued (Plastindustrien i Danmark and Miljøstyrelsen 1991).<sup>28</sup> The aim of the agreement was to "establish cooperation in order for the use of PVC in Denmark to be environmentally optimal while maintaining the competitiveness and development possibilities of the Danish enterprises".<sup>29</sup> The agreement focused on getting PVC waste away from incineration, reuse or disposal of PVC waste and minimizing of i.e. chlorinated paraffins and lead stabilisers in PVC (Plastindustrien i Danmark and Miljøstyrelsen 1991). Apart from the packaging and building sector, targets for a group of other products including medical devices were rather imprecise: reduction by 1000 tons by 1993 and an ambition of further reducing the type of PVC that ends up in the waste incineration. In relation to medical devices, the industry committed itself to collect an overview of products by 1.4.1992 with the aim of establishing a plan for substituting and reuse in order to decrease the amount of PVC waste treated in incineration (Plastindustrien i Danmark and Miljøstyrelsen 1991).<sup>30</sup>

The agreement included all the PVC products produced in Denmark for Danish use. However, products for export<sup>31</sup>, imported products as well as those enterprises that were not members of the Danish Plastics Federation (Plastindustrien) were not included in the agreement (Plastindustrien i Danmark and Miljøstyrelsen 1991).

The agreement included a vision of making PVC environmentally harmless by keeping it from turning to energy and emissions. By doing this, clean environment and PVC could coexist – despite the use of PVC. By recycling PVC, the claimed environmental impacts of PVC would not appear as overflows; they would be included in the new framing. Rather than attributing a quality of environmental

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<sup>28</sup> The agreement was signed by the Confederation of Danish Employers, Council of Industries (Industrirådet, Plastindustrien i Danmark), Danish Chamber of Commerce (Detailhandel) and Local Government Denmark (Kommunernes Landsforening).

<sup>29</sup> Translated from Danish by author.

<sup>30</sup> In 1994, reuse of materials or products in the product category of clinical disposables in hospitals did not exist in Denmark (Dansk Sygehus Institut and Carl Bro 1994: 31). Furthermore, disposal of all waste with infection risk should be carried out in a special incineration oven (Miljøstyrelsen 1984a: 10).

<sup>31</sup> In 1990, 95% of the Danish production of urine bags was exported (Hillersborg and Ottosen 1990: 87).



harmfulness to this material, the boarder between environmental friendliness and harmfulness would be dislocated making PVC and thereby products made of PVC potentially environmentally harmless. Thus, the voluntary agreement crystallized a change of focus regarding PVC in the public arena. The agreement was based on reuse of PVC: The PVC debate had become a debate of waste management rather than a profound reformatting of the very use of PVC suggested by the banplans. Not all actors in the field, however, joined the wagon. According to Greenpeace, for example, a sorting of PVC separately for each product type was an unrealistic goal. Furthermore, this would not substantially reduce the use of PVC in the coming 30-50 years. PVC could thus not be made environmentally harmless by recycling (Greenpeace 1991).

The agreement turned part of the industry using PVC into waste managers and those paying for the thereby potentially achieved environmental friendliness of PVC. Furthermore, no radical closure in terms of which products were allowed to enter the market was posed. PVC was still allowed to be a quality of different products, including drainage bags. If reuse would have been accomplished at an appropriate scale, a step towards deproblematization of PVC would have been taken without having to change the modalities of selling and buying plastic products.

The Agreement Regarding the Use of PVC was very definite about the cooperation between partners only taking place as far as the competitiveness of the Danish industry could be maintained. Indeed, if the development in other countries would not be similar to that in Denmark, the agreement could be brought into reconsideration (Plastindustrien and Miljøstyrelsen 1991):

”It is a precondition that the international development is moving in the direction of PVC not being used in packaging and other goods with a short time-of-use-cycle. It is taken into consideration whether countries that constitute considerable markets for Danish products and countries wherefrom Denmark has a lot of import have made or carried out rules/agreements, that lead to a decrease in use of PVC in packaging and other products with a short lifecycle.” (Translated from Danish by author)

The Agreement on Reduction of the Use of PVC from 1991 set a number of targets for reducing the amount of PVC used and for increasing the amount of PVC recycled which were meant to keep PVC out of incinerators. The reduction targets for PVC packaging for 1993 and 1995 were reached (Jørgensen and Høier 1995: 44) and in 1999, it was assessed that a reduction of 85% by the year 2000 was within reach (Miljø- og Energiministeriet 1999c: 13). Regarding other PVC products, including hospital devices, the target of reduction by 1000 tons was achieved already in 1992 (Jørgensen and Høier 1995: 32). The building sector, however, did not come close to reaching its goals in PVC reduction: in 1997, it was estimated that only 10-15% of the waste was reused against the goal of 41% by 1995 and 71% by 2000 (Miljø- og Energiministeriet 1999c: 13).<sup>32</sup> These numbers questioned the appropriateness of the agreement in fighting the cause. PVC ended up in waste incineration in large amounts – therefore problems with heavy metals and hydrochlorid acid and cleaning residues were still viable for calculations about the environmental qualities of PVC. Reframing had not succeeded.

In a response to the documentation of the low level of reuse of PVC in the building sector, Plastindustrien came up with a suggestion on how the target could be reached with the help of a WUPPI-plan. WUPPI was – and is – an enterprise that was established in 1998 in order to organize collection and reuse of rigid PVC waste from the building sector in Denmark. In the beginning the WUPPI-plan established cooperation between five large producers of building products made of hard PVC. In its first year, however, the plan did include all the used rigid PVC, and was therefore assessed as being dissatisfactory in its present form in 1999 (Miljø- og Energiministeriet 1999c: 13).

In 1999, the DEPA published a PVC-strategy together with a status report (Miljø- og Energiministeriet 1999c). The PVC strategy replaced the Agreement for Reduction of the Use of PVC from 1991. In this strategy, it was stated that the agreement had proven to be dissatisfactory in terms of reuse of PVC products and reduction of the use of PVC. One of the focus areas in the new PVC-strategy was avoiding PVC in waste incineration and PVC should, to the greatest extent possible, be reused, with the exception of PVC with heavy metal stabilisers.

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<sup>32</sup> According to Plastindustrien's and DEPA's estimates, it was originally assessed that the target of 41% had been reached. However, after Greenpeace showed that the calculations only dealt with production and installation waste, a new investigation was made with quite an opposite outcome and resulted to reassessment of the situation (Miljø- og Energiministeriet 1999b: 12-13).

However, also products that could not be reused or were difficult to sort would be substituted as much as possible (Miljø- og Energiministeriet 1999c: 18-20).<sup>33</sup>

The PVC-strategy from 1999 also initiated a number of initiatives, including a proposal for a fee on new PVC products in order to support substitution and reuse of PVC (Miljø- og Energiministeriet 1999c: 20). In 1999, indeed, a law on fees on polyvinyl chloride and phthalates (Lov om afgift af polyvinylchloride og fthalater) was passed (Lov nr 954 1999). According to the Waste Plan 2005-2008 (2003), the fee was introduced because of the environment and possibly health related effects of incineration of PVC (Regeringen 2003: 76).<sup>34</sup>

The fee could be seen as an incentive for reducing the use of PVC. In November 2003, however, the Minister of Environment suggested that rigid PVC would be excluded from the fee provided that the producers of building products took part in collecting PVC for reuse through the so called WUPPI agreement (Nielsen et al. 2003: 29). In December 2003, the Minister of Environment in cooperation with the recycling company WUPPI A/S agreed on a program of action on collection and recycling of rigid PVC in the 'Action Plan for Collection and Recycling of worn out Products of rigid PVC'. The aim of the action plan was to keep the products made of rigid PVC out of incinerators (Schmidt, H.C. & Wuppi A/S 2003). In February 2004 the bill to remove the fee on rigid PVC was passed in the Danish parliament. The discussion around the removal of the bill revealed – once again – two different framings of PVC: PVC as a sustainable, environmentally neutral material and PVC as environmentally harmful (see i.e. Godske 2004).

The WUPPI agreement took care of the industrial waste in the building sector. However, large amounts of PVC-waste ended up in incinerators from other industries and from the use of other products than building products. In 2000, a Statutory Order on Waste required municipalities to organize the collection of PVC waste from enterprises and public and private institutions to either reuse if possible or disposal (Miljøministeriet 2000). In 2002, DEPA campaigned for an appropriate sorting of PVC waste by publishing a folder "Say goodbye to PVC waste and impregnated wood".

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<sup>33</sup> These targets were also supported by Affald 21, a waste plan from 1999, and waste strategy 2005-2008 (Regeringen 2003: 49).

<sup>34</sup> Translated from Danish by author.

As for 2003, despite the strengthened regulative and programmatic focus on PVC recycling and reuse, it was estimated that 50-60% of the Danish PVC waste ended up in incineration. The low reuse rate was thought to result from an inability to sort all PVC out of the waste streams going to incineration.<sup>35</sup> Furthermore, hazardous residue waste was produced when neutralizing the hydrochloric acid emissions. Therefore, Waste Strategy 2005-2008 called, again, for an initiative to substitute those PVC products that ended up in waste incineration (Regeringen 2003: 300-01).

In 2005, an experiment on the use of sensors in waste sorting showed that online sorting of plastic waste in PVC and non-PVC waste was possible and the speed of the process was sufficient for industrial use (Pedersen and Cramer 2005: 13).

To reiterate, the Agreement on Reduction of the Use of PVC from 1991 crystallized a change in the PVC-debate. The strategy introduced recycling of PVC as a means to make PVC environmentally harmless and thereby contain the problematic overflows in the framing of PVC. If carried out extensively, recycling would thus provide PVC and products made of PVC with an environmentally neutral quality, if not friendly. However, the statistics on recycling of PVC waste participated in problematizing the strategy of neutralizing PVC in regard to the natural environment. PVC waste that ended up in incinerations caused friction in cleaning up the overflows of PVC use. In order to control the waste flows, new controlling and steering devices were introduced in a form of agreements, re-identification of participants to an agreement, plastic recycling labels on PVC and economic sanctions. However, PVC waste was hard to control: the overflow was still translated in figures and national statistic that showed alarming amounts of PVC circulating in a wrong body of wastes. PVC had not gotten rid of its overflows.

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<sup>35</sup> Two labelling systems for plastic materials exist: one for plastic packaging and another ISO standard for all plastics. Use of these labels, however, is voluntary (Miljøvedningen 2007). Labelling can be used to recognize different plastic materials in order to sort them for reuse or recycling.

### 4.2.3. Postponing the environmental concerns related to PVC

Hydrochlorid acid formed in the waste incineration had been seen as problematic from the very beginning of the PVC debate in Denmark. In the mid 1990s where the dioxin debate started to fade, the relative significance of hydrochloric acid was strengthened although it had already been discussed in the 1980s. In a DEPA environmental assessment of PVC from 1995, it was specifically the hydrochloric acid that was seen as the main problem with the incineration of PVC (Møller et al. 1995: 88):

”The main pollution problem caused by the emission from incineration of PVC-containing waste is the emission of hydrochlorid acid.”

Besides having environmentally adverse effects, hydrochloric acid also eroded pipes and chimneys in the incineration plants (Jørgensen and Høier 1995: 11). In order to avoid the erosion, extensive and expensive cleaning of the pipes had to be undertaken.

By cleaning the flue gas, emissions of hydrochlorid acids, heavy metals and phthalates into the air could be avoided. Therefore, the problem was combated by introducing flue gas cleaning systems to all Danish waste incineration plants by 1995 (Møller et al. 1995: 87). This, however, did not terminate the problem with hydrochlorid acid in incineration of PVC. The residues from the neutralization of acid flue gas were described as having environmental impacts due to their chloride, phthalate, dioxin and heavy metal content.<sup>36</sup> In laboratory experiments residues from cleaning acid flue gas showed a risk of leakage from landfills by rainwater which could cause heavy metal and phthalate pollution. The chloride ions participate in mobilizing the heavy metals in the residue product (Møller et al. 1995: 93-97). This waste was classified as hazardous by the EU in 1994 (European Council 1994). In 2004, a DEPA report including a life-cycle analysis of the deposited waste argued that the toxic and persistent substances deposited would be

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<sup>36</sup> Also slag and fly ash from incineration contain chlorine and heavy metals and, according to the report, Environmental Aspects of PVC (1995), should be disposed in a controlled site. However, the amounts of problematic substances in these residues were not reported as high as in the flue gas cleaning residues. (Møller et al. 1995, 93-94). This might explain why slag and fly ash did not receive as much attention in the debate about the environmental aspects of PVC.

released to the environment in the future and, thus, potentially impact the environment and future generations (COWI et al. 2004: 21). In 2005, in another DEPA report on waste sorting based on online detection of basic substances, the problematics related to residues were articulated as follows (Pedersen and Cramer 2005: 21):

”After incineration the residues from flue gas cleaning include large amounts of chloride and heavy metals. In Denmark waste incineration plants produce about 100.000 t of residues from flue gas cleaning pr. year. Deposit of the residues from flue gas cleaning and slag can lead to leakage of heavy metals and chloride to the surroundings. Deposit of PVC waste in the long run leads to decomposition of PVC, heavy metal stabilizers and plasticizers. The decomposition products can leak from the PVC and contaminate water and soil in the environment.”  
(Translated from Danish by author)

Furthermore, for each kilogram of PVC burned, 0,4-1.7. kilogram of hazardous residue product from neutralization of hydrochloride acid emissions was formed (Regeringen 2003: 301).<sup>37</sup>

Already in 1992, the Ministry of Environment had advised that the residual waste would be deposited in specific disposal sites until a solution to the problem would be found (Flyvbjerg and Hjelmar 1997: 17). As for 2007, a solution to the temporary deposits is yet to be found.

By storing the residues in a specific disposal site for hazardous waste, an immediate migration of dangerous substances was avoided. Even though the residue products were seen as problematic, neutralizing made the environmental hazards related to PVC appear in a slightly less uncontrollable form. Cleaning of the acid flue gas did not, however, solve the problems potentially resulting from incineration of PVC waste. The cleaning technology helped transform the problem of emissions in the air to a possible future problem of leakages from disposal sites. Separating the harmful residue from its environment served as a postponement of the environmental harmfulness as a quality of PVC and thus another, yet temporary, reframing of PVC as environmentally not harmful. The responsibility

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<sup>37</sup> In 1995, the estimation had been up to 5.9 kilogram of residual product per 1 kilogramme of PVC waste depending on the technology (Møller et al. 1995: 94).

and the economic costs were born by the owners of incinerations plants, the municipalities.

#### 4.2.4. Dissolving the environmental concerns related to PVC

To get rid of the PVC waste in an environmentally sound manner, development of new technologies took place in the industry. Two chemical recovery projects, Watech and Stignæs methods for recovering PVC waste, were started in Denmark in the 1990s. The aim of these two projects was to dissolve PVC incineration residues and PVC waste, respectively, into their basic components, water and salts.

The Stignæs project started in 1996 (RGS 90 A/S 2002) and was supported by Vinyl2010, the European Union's Life-programme (Vinyl2010 2005: 26), DEPA and Danish PVC converters (The PVC Information Council Denmark 2003). This project developed a process where all the components of PVC could be recovered as salts, oils and mineral residues and reused. In 2005, the Stignæs industrial demonstration pilot project on chemical reuse of PVC waste in RGS90s full scale feedstock recycling plant was discontinued (Vinyl2010 2006: 23).

Another chemical recycling project on a process technology that was later named Halosep-Watech was started in 1993.<sup>38</sup> The technology was designed to recover and recycle chlorides and heavy metals contained in the solid fraction derived from the neutralisation of hydrochlorid acid. The trial phase was completed in 2006 in Denmark and featured success in separating chlorides and heavy metals from the waste residue. This decreased the quantity of hazardous waste and transformed a large part of the waste into a marketable product. In 2006, a DEPA project showed that it was possible to recover different kinds of salts also from municipal waste – not only industrial PVC waste – in a quality that corresponded to commercial products. Furthermore, it was possible to concentrate heavy metals in a filter cake that could be sent to metal recovery or to a specific disposal site (Nyttiggørelse af kommunal indsamlet PVC-affald 2006: 15). As for 2007, RGS90, the owner of the

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<sup>38</sup> In 2001, Watech A/S was established by a Danish company NKT to develop a chemical recycling technology for PVC (Fjeldberg 2002). The project received financial support from DEPA (already since 1997), European Council for Vinyl Manufacturers and Norsk Hydro (Fjeldberg 2002). In 2003, Watech was taken over by RSG90 (NKT Holding A/S 2003).

innovation, was looking for partners to build a Halosep-Watech demonstration plant of commercial size (Vinyl2010 2007: 23). This plant would be able to recover one fourth of the Danish PVC waste (PVC Rådet 2002).

Breaking down PVC waste or incineration cleaning residue into its basic components in chemical recovery processes offered a new way of making the environmental over-flow of PVC non-problematic and thus reframing the hazardous PVC. The consequence of application of this technology in a large scale would have been a profound change in the environmental qualities related to PVC and to products made of PVC. If accomplished, the new technologies could make the use of PVC environmentally neutral. However, these methods did not run smoothly and as for now, the chemical recovery of PVC has not been able to redeem the potential that was ascribed to it. Two reasons for the closure of the Stignæs project were indicated: technical difficulties and availability of raw material. The uncertainty of the availability of raw material was also named as a reason for difficulties in finding investors for a Watech-Halosep plant (PVC Rådet 2002). The problems in the availability of PVC material seemed to stem from badly functioning public and private sorting systems on the other hand, and from a price mechanism that made disposal of waste and residues in municipal landfills economically more beneficial (Vinyl2010 2006: 23).<sup>39</sup>

Another example of how the perceived environmental problems (possibly) related to PVC were physically dissolved can be encountered in the area of waste incineration and dioxin destruction. As mentioned before, there was a great deal of scientific controversy surrounding the role of PVC in dioxin formation. The discussion around PVC and dioxin, however, did not diminish altogether (i.e. Møller 1995, Miljø- og Energiministeriet 1999c, Regeringen 2003). The uncertainty of the role of PVC in dioxin formation in waste incineration was never stabilized scientifically. However, on the turn of the 21<sup>st</sup> century, the Danish implementation of EU's Directive on the incineration of waste (European Council 2000) introduced dioxin filters to almost all Danish waste incinerators (Fødevareministeriet and Miljøministeriet 2003: 3). The filters caught the dioxin formed during the incineration process after which the filter material was fed into

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<sup>39</sup> In their unpublished paper from 2007, Georg and Karnøe also point out similar difficulties that a particular PVC recovery technology faced when its entry to the Danish and European market was attempted. Georg and Karnøe show how well stabilized actor constellations in the waste sector including particular price mechanisms that favour incineration and landfill options resulted in abandoning a new recovery technology (Georg and Karnøe 2007).



the incineration oven. The incineration process destroyed the previously formed dioxin (Hansen 2000: 76). Installing filters meant that the expenses related to all the possible sources of dioxin in waste incineration remained with the municipal owners of the incineration plants.

After the installation of dioxin filters, the settlement of the role of PVC in dioxin formation became unnecessary. The environmentally hazardous overflows could now be neutralized no matter whether they came from PVC or not. If dioxin would be connected to PVC again, PVC or PVC products would now have been reframed in a way that included the destruction of dioxin emissions.

#### 4.2.5. Substitution of harmful substances in PVC

Two groups of substances, heavy metal stabilisers and phthalate plasticizers, have been subject to substitution attempts in order to make PVC both environment and health wise less harmful. Substitution of either phthalates or heavy metals has and would have had rather different influence on the markets due to the availability of suitable alternatives.

##### **Heavy metals**

Heavy metals have been used as stabilisers in PVC. While the extraction of heavy metals from a surface of a PVC product has been estimated as low (Møller et al. 1995: 11), heavy metals can find their way to the environment when incinerating PVC. By the time PVC was problematized, the environmental and health effects of heavy metals were already rather undisputed. A DEPA report from 1995, described the environment and health related effects of heavy metal stabilizers as follows (Møller et al. 1995: 10):

”Lead is acute toxic to the aquatic environment and is classified as dangerous to the environment. Lead affects the nervous system and the reproduction system.

Cadmium is acute toxic to the aquatic organisms and fulfils the EU-criteria for classification as dangerous to the environment. Long-term exposure of humans to low air levels of cadmium may lead to chronic kidney, lung, liver and bone diseases. Occupational exposure to

cadmium containing substances, probably the oxides, increases the risk of prostate and lung cancer.”

After the incineration of PVC, heavy metals can be found emitted in air, and in slag or in fly ash. Depositing the slag and the fly ash in a landfill again provides a potential of leakage to the environment. Furthermore, the high amount of chloride in this waste will increase the risk of leakage. If the acid flue gas is cleaned, heavy metals can be found in the cleaning residues depositing of which will again carry a risk of leakages (Møller et al. 1995: 90-91).

The substitution of heavy metals as stabilizers in PVC was discussed already in the early 1980s. Selling, importing and producing products with Cadmium, including PVC with Cadmium stabilizers, was forbidden in Denmark in 1993 (Nielsen et al. 2003: 18). The Agreement Regarding the Use of PVC stated as one of its goals to minimize the use of lead stabilizers in PVC (Plastindustrien i Danmark and Miljøstyrelsen 1991). A target, outphasing of lead stabilizers in the group of other products – including medical devices – by 1993, was reached (Miljø- og Energiministeriet 1999c: 15). By closing down the possibility of using lead in medical devices, PVC was not problematic for this product group in terms of heavy metals. PVC was now reframed in terms of its perceived environmental impacts related to heavy metals. Only products made of PVC without heavy metals would now qualify in the medical devices market. The outphasing of heavy metals, then, stabilized environmental friendliness regarding one of its components as a product quality of drainage bags. Furthermore, the costs of this reframing were carried out by the medical industry whose supply chains for stabilizers were reformatted.

A ban on lead as a stabiliser in PVC was enforced in 2001 (Nielsen et al. 2003: 25) and resulted in the end of using heavy metals in PVC. By substituting the heavy metals as stabilisers in PVC, PVC was gradually made environmentally compatible in this respect. However, as PVC has been used for decades, heavy metal problem in waste incineration and disposal was not cleared at once. Heavy metals used in old PVC products still problematize PVC in waste management.

## **Phthalates**

Besides heavy metals, also phthalates have been discussed as a possible object of substitution. The use of phthalates is very closely linked to soft PVC: according to

a report published by DEPA in 1984, 95% of phthalates were used in the PVC-industry (Miljøstyrelsen 1984b: 1). There have been a number of scientific investigations both in Denmark and other countries as well as EU in order to show the environment and health related effects of these plasticizers. Already in 1980s, a Danish report showed that phthalates were to be found in our everyday environment, not only the polluted areas, and that phthalates might accumulate in some aquatic organisms. These two issues led to thinking of phthalates as a general environmental problem (Miljøstyrelsen 1984b: 1). In laboratory experiments on animals, phthalates have shown signs of being carcinogenic, impairing the capacity for reproduction and harmful for embryos (Miljøstyrelsen 1984b: 1, Møller et al. 1995: 10, Stuer-Lauridsen et al. 2001: 9, Jørgensen and Høier 1995: 11-12, Miljøministeriet 2003a: 21-23).

In the case at hand, especially one of the phthalates, di(2-ethylhexyl) phthalate (DEHP), is of interest. It is the dominating plasticizer in medical devices with which one has almost 50 years of experience (Karbæk 2003: 13, Dansk Teknologisk Institut 1991: 17, SCENIHR 2007: 9). DEHP has been suggested to "exhibit chronic toxicity to aquatic organisms" and "cause long-term adverse effects in the aquatic environment" (Møller et al. 1995: 10, (Miljøministeriet 2003a: 21-23). Furthermore, the migration of DEHP up in the food chain cannot be ruled out (Miljøministeriet 2003a: 21-23). In 2003, DEHP was entered on the list of dangerous substances, classified as toxic to reproduction in EU-risk assessments (Miljøministeriet 2003a: 9).

In the case of medical devices, the problem related to phthalates has often been articulated to be the migration of phthalates to the patient and potentially following reprotoxic effects (i.e. (Miljøstyrelsen 1984b, Miljø- og Energiministeriet 1999b, Karbæk 2003). Phthalates, indeed, problematize PVC not only regarding its environmental effects but also regarding its direct health effects. In the 21<sup>st</sup> century, the EU played a significant role in articulating the risks related to phthalates, including DEHP, in relation to medical devices. According to the EU risk assessment of DEHP finalized in 2003, 'concerning exposure of consumers from medical equipment, there is concern for testicular, fertility, RDT and developmental (excluding children) for the exposure scenarios of long term haemodialysis in adults, long term blood transfusion in children and transfusions in

neonates' (National Chemicals Inspectorate 2001, p. 296).<sup>40</sup> However, up until today, no clinical evidence of adverse effects related to the use of DEHP in medical devices have been detected in any particular patient group. Despite of this, according to the EU, in situations of elevated and prolonged exposure the risks and benefits should be considered carefully (EU's videnskabelige komité for medicin og medicinsk udstyr 2002: 25-26, National Chemicals Inspectorate 2001: 296, SCENIHR 2007: 4).

Despite the suspected adverse effects of phthalates articulated already in the 1980s, it was not until the mid and late 1990s that measures aiming for substitution of phthalates were launched. In October 1995, the Minister of Environment, Svend Auken (Social Democrats), started a mapping of possibilities for substituting soft PVC because of its phthalate content. This investigation was to form a base for a programme of Action for Outphasing of Phthalates (Auken 1996). DEHP was included on a list of unwanted and possibly unwanted substances in 1996 and has remained on the list since then (Miljøstyrelsen 1996, Miljøstyrelsen 1997, Miljøstyrelsen 1998, Miljøstyrelsen 2000a, Miljøstyrelsen 2000b, Miljøstyrelsen 2004a, Miljøstyrelsen 2004b).

In 1999, DEPA published an Action Plan to Reduce and Phase out Phthalates in Soft Plastics in Denmark (Miljø- og Energiministeriet 1999b). The long term goal of the plan was to outphase the problematic plasticizers and reduce the use of all plasticizers by 50% by 2009. Medical devices were a priority for reduction and substitution of phthalates because of the possible migration from plastic materials. However, it was estimated that a direct health impact was relevant only in some very few cases (Miljø- og Energiministeriet 1999b: 5, 31).

The change proposed by the proposal of outphasing phthalates was rather significant for the medical industry that uses PVC. If phthalates would be banned or restricted in PVC, this would change the whole picture of PVC use in medical devices. It would bring about a drastic change in the realm of urine bags: urine bags made of PVC would cease to exist – unless an alternative phthalate would be found or the ban would not cover urine bags. In the absence of alternative plasticizers, the whole urine bag sector would be reconfigured

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<sup>40</sup> This risk assessment has basically been reopened and as for now, no Commission communications are available for DEHP and BBP.

The focus on phthalates led i.e. to a ban on DEHP and DBP in products for children under a certain age in 1999 (Miljø- og Energiministeriet 1999a)<sup>41</sup> and in inflatable swimming equipment in January 2001 (Nielsen et al. 2003: 22).<sup>42</sup> In 2003, DEPA evaluated a possibility to substitute DEHP also in medical devices (Karbæk 2003). It was concluded that ”much more data was needed before DEHP could be seriously substituted in medical devices”. Also Medicoindustrien brought up the difficulties in finding suitable alternatives in their letter to the Minister of Domestic Affairs and Health. According to Medicoindustrien, there were a number of alternatives to phthalates in general and to DEHP specifically. However, hospitals seemed not to procure products using these because of their higher price or lower quality (Nørgaard-Andersen 2005).<sup>43</sup>

As for today, there is no information about the substitution of phthalates in PVC in medical devices covering all of Denmark (Rasmussen 2007c). According to the Status on Phthalates by the Ministry of the Environment in 2003, the consumption of phthalates in general had fallen by 15% since 1995 (Miljøministeriet 2003a: 9). Two issues have contributed to the difficulties in outphasing phthalates. Firstly, there has been a scientific uncertainty and controversy concerning the impacts of phthalates. In the absence of supporting scientific results, the enactment of phthalates, DEHP in particular, as environmental harmful was difficult and continuously contested. In the discussions carried out in the Danish Parliament in 2007 on phthalates in medical devices, the Minister of Health, Lars Løkke Rasmussen, for example, referred to both the quality issues and the scientific

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<sup>41</sup> In February 2004, also the European Commission issued a decision 1999/815/EC concerning measures prohibiting the placing on the market of toys and childcare articles intended to be placed in the mouth by children under three years of age made of soft PVC containing certain phthalates (European Council 2004). In December 2005, it was decided by the EU that use of phthalates in toys for children between 0-14 years would be regulated. In 2002, the Danish Minister of Environment started discussions with the Danish Commerce and Service (Dansk Handel & Service) and the trade organization for toy producers (Legetøjsbranchens Fællesråd) on future measures to limit phthalates in toys for 3 to 6 year old children (Miljøministeriet 2003a). In 1993, Danish Commerce and Service announced that their members would not purchase any toys with phthalates for older children when these toys are designed to be sucked (Miljøministeriet 2003b).

<sup>42</sup> Furthermore, in 1999, a law on fees on PVC and phthalates was passed and enforced on July 1 in 2001. Thereby a number of PVC and phthalate products had to pay a fee. The fee was highest for those soft PVC products that use phthalates. Medical devices of PVC were not included in this arrangement (Lov nr 954 1999).

<sup>43</sup> In 2005 yet another new alternative plasticizer to phthalates, Grinsted soft-n-safe, was launched by Danisco. The product received authorization to use and sell in EU and was expected to be taken into use in medical devices, amongst others (Danisco 2005).

controversies on the impacts of phthalates as reasons for not introducing legislative measures to out phase phthalates in medical devices (Rasmussen 2007a, Rasmussen 2007b and Rasmussen 2007c).

Secondly, finding substitutes for phthalates in medical devices has not taken place on a large scale. Framing of the regulatory base for production of medical devices to include this possible overflow was not supported by readily available alternatives for plasticisers. The industry's motivation to find alternative plasticisers for medical devices might have been influenced by the perspective that European Pharmacopoeia had on DEHP. European Pharmacopoeia was – and is – a listing that provides quality standards for medicines and medical devices in Europe. As the European Pharmacopoeia that considered DEHP the only plasticiser for medical devices had a similar weight to that of the Directive for Medical Devices (July 1988), the manufacturers were left with a dilemma. If they would use another plasticizer in their medical device, they would have to declare that their product did not conform to the compositional requirements of the Pharmacopoeia (Karbæk 2003: 13).<sup>44</sup> Furthermore, research has not been able to deliver a clear understanding about the influence of exposure on humans (SCENIHR 2007: 45).

## 4.3. Conclusive summary

Environmental concerns have created overflows in the framing of PVC which urine bags traditionally are made of. Different and often contested versions of environmental harmfulness, impacts of dioxin, phthalates, heavy metals and acid flue gasses to name some, have been enacted in separate investigations, experiments and tests. Indeed, scientific measures and evidence have played a great role in performing the different environmental impacts of PVC. These different enactments of environmental impacts are both kept separate from and related to each other in the public arena: PVC is clearly perceived as having different types of environmental impacts that are also sometimes dealt with

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<sup>44</sup> However, according to the Preliminary report on the safety of medial devices containing DEHP plasticized PVC or other plasticizers on neonates and other groups possibly at risk (2007) from the European Pharmacopoeia also ESBO and ELO could be used as plasticizers in medical devices (SCENIHR 2007: 11).

through different measures. Furthermore, the environmental harmfulness of PVC is closely linked to its anticipated health effects. These effects are indirect effects, so called environmental health aspects. By first polluting the living environment the hazardous substances also affect the health of human beings. However, especially in terms of phthalates, PVC or its components are also articulated as having direct health impacts for the user of the PVC product. In the problematization of PVC, health and environment are intertwined.

Although all the debated environmentally adverse effects were to some extent articulated already at the outset of the debate in the 1980s, the relative weight and form of them in terms of creating overflows to the framing of PVC varies. Dioxin becomes a non-issue in terms of PVC, the problems with acid flue gas transforms from being an acidification and erosion problem to being a leakage and disposal problem, and phthalates obtain a stronger role the closer to today we make our way. In terms of medical devices, the focus changes from PVC to phthalates and thereby the linkage to health becomes even more accentuated than previously. The environmental problems related to PVC are translated, transform and travel in interaction with new technical solutions to problems, scientific results and politics.

There are several different kinds of attempts to deal with the overflows and to reframe PVC as environmentally neutral: banning PVC altogether or substituting it in some product groups, avoiding bringing PVC to the phases in use where its anticipated environmental impacts cannot be easily avoided, neutralizing the impacts of PVC waste management, making the environmental impacts of PVC use non-existing and substituting single sources of environmental impacts of PVC. Furthermore, the environmental impacts of PVC use are postponed. Across the years, the nature of these attempts changes: starting from attempts to out phase PVC, the debate evolves to outphasing of different harmful components in PVC. Furthermore, rather than concentrating on the beginning of the life-cycle of PVC in terms of PVC substitution, the focus changes to the end of its life-cycle: waste management. PVC remains problematized yet the focus on what overflows are available and dealt with changes.

With an exception of outphasing heavy metals, destroying dioxins, outphasing PVC in most packaging and recycling PVC building waste, dealing with the claimed harmful effects of PVC has culminated in the postponement of the environmental impacts related to PVC. Why then, despite of the continuous

problematization of PVC in the past decades, have the concerns not been settled as possible solutions to the stated problems have been available? Answering this question is not the aim of this dissertation. However, traces of what has led to the present situation can be seen also in this text. A researcher interested in this topic could follow the ways in which municipal waste fees are constructed and how these influence the way waste is disposed. Furthermore, regarding the option of substituting PVC, the networks and their strength related to the use of PVC could be explored. PVC is one of the most widely used plastic materials and restrictions related to its use or its different components would have extensive effects on society and the business life relying on PVC-plastics.

To return to the initial question of this chapter, what, then, are the influences of this evolving debate and attempts to regulate the use and the character of PVC for the markets for drainage bags and moreover on the stabilization of environmental friendliness as a product quality in market transactions? Are markets a combination of rules defined by public powers and private agents (Callon et al. 2002: 299)? Outphasing of PVC would have powerfully reformatted the whole urine bag market: no PVC bags would have been available any more. Environmental friendliness in this particular form would have become a major principle organizing the market exchange. A ban would have functioned as a closure mechanism, to use a term from Holm and Nielsen (Holm and Nielsen 1997: 177), conducting important qualification work already before the objects of transaction would have entered into the relationship between the seller and the user. Outphasing phthalates would basically have had a very similar influence unless alternative phthalates could have been pointed out. Without DEHP and some other phthalates, producing soft drainage bags made of PVC would not have been possible. These measures, however, were not carried out on a scale that would have closed out some options in the market for drainage bags. Today, PVC and DEHP amongst many other phthalates are allowed in the production of products in all product groups. PVC- or phthalate-freeness has not been stabilized as qualities pre-qualifying a drainage bag for a market transaction.

The measures taken and attempted in order to reframe PVC as environmentally neutral, I argue, have influenced the market. Indeed, it is due to this reframing taking place in the public arena that PVC use is still legally possible today despite the constant problematization of the material. The environmental overflows have been included in the framing of PVC to a certain extent. Some of the articulated



environmental impacts of PVC have been neutralized with the help of filters and cleaning mechanisms, depositing the cleaning residue on special deposits, recycling PVC material and waste and outphasing hazardous stabilizers – at least tentatively. These ways of dealing with overflows have enabled maintaining PVC in Danish plastic products.

However, even though the overflows are now partly contained by the frame, there is still friction: a great many PVC products still end up in incineration, the amount of phthalates used in PVC has not declined drastically and the special disposal site for acid gas cleaning residues might leak. According to Callon (2002), "the consequence of overflowing is a constant (re)creation of new political spaces" (Callon et al. 2002: 286) which, indeed, can be witnessed in this case. The reoccurring attempts and failures to keep the environmental overflows within the frame and prevent new overflows from occurring have created a movement between a continuous de- and re-problematization of PVC. Visible overflows and reoccurring problematization of PVC has made the articulation of PVC and PVC products as environmentally neutral or friendly difficult. In the world of overflows, constructing a quality of environmental friendliness is not a simple matter.

Although the focus of this chapter has not been on the relations between different actors and actor groups, it is clear that different groups of actors consisting of both humans and non-humans and driven by different concerns are visible in the attempts to enact PVC as environmentally friendly or harmful. The measures stemming from the public sphere have also changed the identity of different actors and reformatted the landscape of business relations. Today, some producers have become organizers of recycling of PVC in addition to the producer role – though not the producers of medical devices. Getting rid of PVC waste in the building sector has become an activity that the industry has to pay for itself. Also, development of PVC recovery plants is an industry initiative even though it has also received financial support from the public. In addition, outphasing lead and cadmium has equipped the producers with a different supply chain in regard to stabilizers. However, not all the responsibility, economic or organizational, is redistributed to the producers of PVC products. The majority of PVC used in Denmark still end up in incineration. Dealing with the environmental problems that are related to this waste stream is the task of municipalities, who are responsible for the installation of cleaning mechanisms and filters as well as organizing of special disposal for the hazardous residues from incineration. The economic

burden related to cleaning flue gasses, disposing the hazardous residues and possible migration of phthalates is carried out by the public owners of waste incineration plants and the Danish health care system.

As we have seen, PVC as a material has been an object of continuous reframing efforts and problematizations. It is relevant to ask how these different measures and debates in the public sphere might have influenced the stabilization of any form of environmental friendliness as a quality of a drainage bag, the market object. This, amongst other issues, is elaborated in the following two chapters on production, procurement and use of drainage bags.

# 5. DEVELOPING AND MARKETING A GREEN DRAINAGE BAG

In the year 2007 the Danish market is abundant with different types of urine bags. The assortments provided by the two largest trading companies, Kirudan and Danpleje, consist of bags from seven different producers. In addition to this, there might be several other producers who only sell directly without any resellers or agents. A brief look at the ways in which these different suppliers or the trading companies themselves market drainage bags reveals that environmental friendliness is discussed only in regards to two urine bags from the Danish producer Coloplast: Conveen Security+ and Moveen. These bags are based on non-PVC materials and are marketed as environmentally friendlier than bags made of PVC. Judging from the marketing materials that are available on the internet from different producers, environmental friendliness is not one of the main issues in selling urine bags.

In this chapter, we look deeper into how – if at all – environmental friendliness is made a product quality for an object of exchange, a drainage bag, in a process where a particular urine bag is developed, produced and marketed. The product in question is the above mentioned Conveen Security+ urine bag, one of the few urine bags and indeed the oldest that is currently marketed with a reference to the environment. Conveen Security+ provides a good starting point for an inquiry into the work that is needed for a particular version of environmental friendliness to acquire material form and potentially make markets for environmentally friendlier drainage bags somewhat more real. In the course of product development, production and marketing, environmental friendliness is not, however, the only product quality that is strived for. Sometimes environmental friendliness and other product qualities prove to be incompatible with each other. The case of Conveen

Security+ is therefore also a case of modalities that make environmental friendliness stable and even dominant or, at times, delegate it to the periphery in relation to other product qualities.

This chapter starts with a brief introduction to Coloplast in general and the process of developing Conveen Security+ drainage bag. After the introduction, I will discuss how a particular enactment of environmental friendliness, namely PVC-freeness, became significant in relation to Conveen Security+. I then proceed to investigate how PVC-freeness is gradually made a product quality amongst other product qualities. The work required to stabilize PVC-freeness is discussed in relation to events where it has to be coordinated with other, possibly conflicting product qualities. In the end of this chapter, I will discuss the role of PVC-freeness in marketing.

## 5.1. Coloplast and Conveen Security+

Coloplast was founded in 1957 as a producer of plastic colostomy bags in Denmark. Today, it has subsidiaries in 22 different countries and production facilities in Denmark, Germany, Hungary, USA, Costa Rica and China. Coloplast employs more than 6000 people. In the early 1980s, Coloplast's colostomy products were amended with two new business areas: continence care products and wound care.

In 1983, Coloplast began to sell urine bags whose production, however, was outsourced to another producer. Coloplast began to manufacture its own urine bags in 1985. By 1986, Coloplast produced three different drainage bag models: a standard Conveen urine bag (500 ml), a Conveen urine bag (1500 ml) and a Conveen contoured leg bag (600 ml). All bags were designed to be sold in a high quality, high price segment. Coloplast also produced a 2000 ml bed bag, the production of which was discontinued in the late 1980s (Mathilde).<sup>45</sup> In 1988, the product development and commercial marketing professionals in the continence care division started to work on a number of new products, including a 500 ml leg

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<sup>45</sup> Interview with Mathilde, chief of product development at Coloplast March 9 2007.

bag and to plan a new product assortment.<sup>46</sup> In this chapter the focus will be on the development of the 500 ml leg bag which is today called Conveen Security+.

The development of Conveen Security+ was launched in November 1988 (Coloplast 1988). The product development process consisted of different partly overlapping and interlinked activities. Coloplast product development staff organized user panels and user tests, experimented with different PVC-free materials, different designs and functionalities and developed new production technology together with production engineers, marketing staff, procurers and suppliers. In February 1993 the steering group of the project declared the project officially finished (Coloplast 1993b). The Conveen Security+ bag was launched in Germany in 1992. By August 1994, Conveen Security+ had been launched in Germany, Denmark USA, Sweden, the Netherlands, France and Switzerland (Coloplast 1994a). Joakim, a product manager, tells me that the bag is now sold in all the significant markets for Coloplast.<sup>47</sup> In Denmark, Conveen Security + covers close to 70% of Coloplast's urine bag sales. In 1997, the 500 ml bag was accompanied by a 350 ml and a 750 ml bag.

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<sup>46</sup> Interview with Mathilde, chief of product development at Coloplast November 7 2006, interview with Johan, product development engineer at Coloplast, March 29 2006 and interview with Lise, product manager at Coloplast, May 17 2006.

<sup>47</sup> Interview with Joakim, Product manager at Coloplast, June 12 2006.

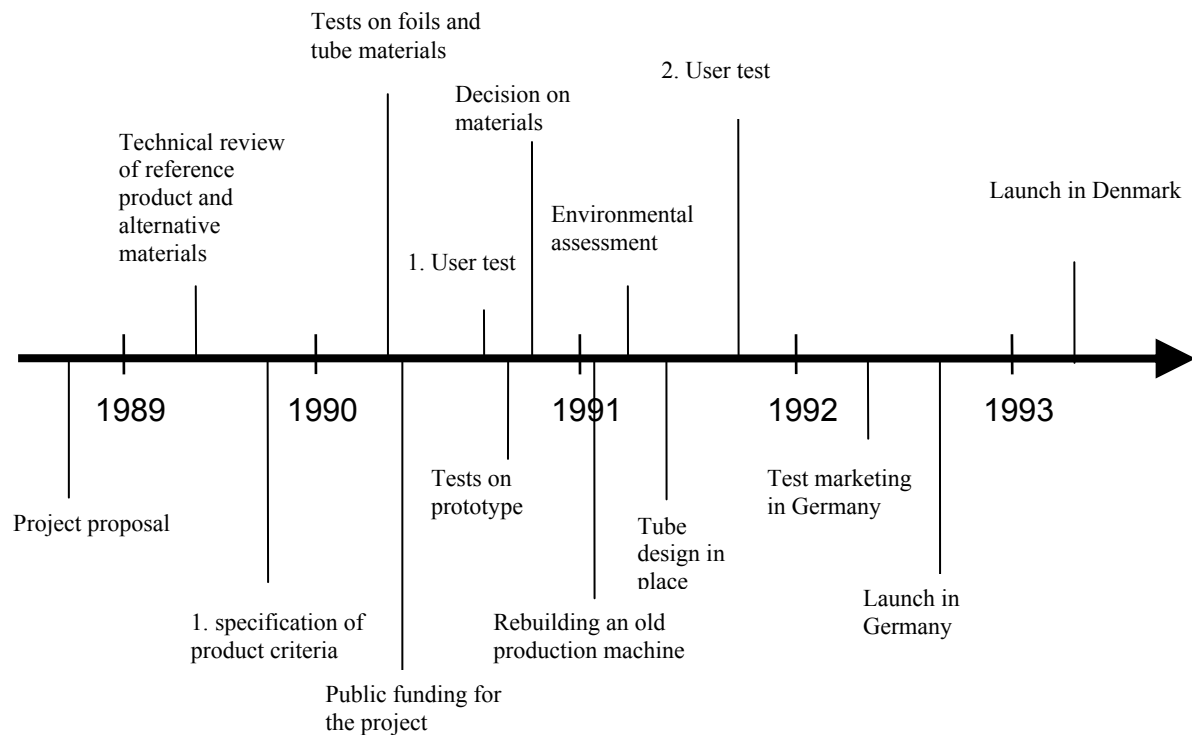


Figure 1: Product development of Conveen Security+

## 5.2. Environmental friendliness: making a distinction

Before we start investigating the process in which environmental friendliness gradually acquires more stability in relation to other product qualities, I wish to briefly discuss the forms in which environmental friendliness was enacted in the course of the product development process. Environmental friendliness was one of the main components of the product idea when it first emerged. The 500 ml drainage bag project that started in 1988 was essentially a project to develop an environmentally friendly bag. In the early documents the project was called the "green bag project" and one of the primary qualities of the product to be was environmental friendliness.

Environmental friendliness was defined as PVC-freeness, as articulated by Johan, a product development engineer and Mikkel, chief of commercial development (translated from Danish by author):<sup>48, 49</sup>

Satu: "Did you discuss other environmentally related issues or was it primarily PVC?"

Mikkel: "It was. It was about PVC freeness at that time."

Johan: "So, concerning the purely environmental parameters I would say that it was primarily about getting away from that material [PVC]."

PVC was perceived as environmentally problematic in terms of the external environment. However, according to Mathilde, a product development engineer and chief of product development, the production technology used for PVC, high frequency welding, also posed some problems in regard to working environment when the production was not fully automated.<sup>50</sup>

At the outset of the product development process, another, non-PVC related environmental question was considered, according to Mathilde. The material that the clamp was made of was not originally perceived as environmentally friendly. In the beginning the idea was to substitute the clamp with another clamp made of alternative materials. However, it was later on decided that an existing clamp would be used. It was estimated that designing a new clamp would be too time consuming and difficult and that the environmental impact would be limited as the clamp was such a small part of the bag.<sup>51</sup>

Concentrating on the environmental impacts of PVC was not something that only happened at Coloplast. As the previous chapter showed, PVC substitution and thus also the boundary between environmental friendliness and harmfulness was widely discussed in national politics and research. Indeed, at her previous work place, Mathilde had been working with research on PVC-substitution in the Technology Institute in Jutland. At Coloplast, she shared an interest in PVC-related problems with the head of the division which led to the product idea for a PVC-free urine

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<sup>48</sup> Interview with Johan, product development engineer at Coloplast, March 29 2006.

<sup>49</sup> Interview with Mikkel, chief of commercial development at Coloplast, April 27 2006.

<sup>50</sup> Interview with Mathilde, chief of product development at Coloplast November 19 2007.

<sup>51</sup> Interview with Mathilde, chief of product development at Coloplast November 7 2006.

bag.<sup>52</sup> Coloplast became a visible part of the discussion in the public arena when the urine bag project received financing from the Council for Recycling and Clean Technology in 1990. The financed project consisted of the development of a drainage bag made of alternative materials, development of appropriate production technology and economic assessment by Coloplast and environmental assessment of the alternative bags and materials by the Danish Technology Institute (DTI)<sup>53</sup> (Coloplast 1990j, Coloplast 1991d).

These publicly financed environmental assessments of alternative materials and of another comparable product made of alternative materials further stabilized the distinction between environmentally friendly and harmful products and materials that was built precisely on distinguishing between PVC and PVC-freeness. The alternative product that was tested in the project was one of the first prototypes of Conveen Security+. In this assessment, the product made of alternative materials was evaluated against a PVC reference product. In this way the enacted environmental impacts of PVC also became the ultimate threshold that was not to be exceeded if the product should be environmentally friendly.

In the assessment, it was concluded that clear environmental improvements had been achieved in the bag made of alternative materials in comparison to the reference product. This was mainly due to the substitution of PVC and was seen in almost all of the different parts of the product life-cycle (Coloplast 1991d). With the help of this assessment, environmental friendliness of alternative materials was made calculable and comparable to those of PVC in a particular frame that included a wide range of possible emissions in different parts of the life-cycle of the products.

This attempt to stabilize PVC-freeness as environmental friendliness was, however, not performed in order to investigate whether PVC really was the foe. According to Johan, the product engineers already knew from the start that there

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<sup>52</sup> Interview with Mathilde, chief of product development at Coloplast November 19 2007.

<sup>53</sup> Environmental assessments were made based on analysing the environmental impacts of alternative materials and both PVC and non-PVC products during their life cycle. This meant that environmental impacts of raw material production, semi fabricant production, product production, use, reuse and product disposal were assessed regarding resource use, working environment, environment and in case of an accident. Environmental friendliness was broken into many smaller subqualities which in the end were compared against each other within a particular frame including and excluding different qualities and finally comparing the outcomes with those of PVC (Coloplast 1991d).



was a "light year" of difference between the alternative materials and PVC.<sup>54</sup> In a way, the preference of PVC-free materials was already black boxed as the foe amongst the product developers: it no longer needed to be considered (cf. Callon and Latour 1981: 284-85). Calculating and making PVC-free materials comparable with PVC in terms of the environment was part of Coloplast's strategy for arguing for the distinction between environmentally friendlier products and environmentally more harmful products.

Satu: "Why did you want those environmental assessments? Because it did include a lot of work."

Mathilde: "Yes, it was because, if we came and said that now we have an environmentally friendly product or a PVC free product, then there had to be documentation for it. Documentation as such is a necessary precondition for Coloplast to launch the product. So that you don't bring out a thing that is not trustworthy."<sup>55</sup> (translated from Danish by author)

The environmental assessment was carried out to work as some kind of a demonstration device of scientific character that visualized the overflows in the framing of PVC (cf. Callon 1998a: 258) and simultaneously rendered PVC-freeness as a solution to the problems with PVC. Precisely because of its roots in the scientific systematic inquiry it was expected to carry the power to stabilize the environment related distinction between PVC and non-PVC materials – also outside of Coloplast on later occasions. Environmental friendliness was not only to be stabilized within Coloplast. The aim was to keep it stabilized outside of the firm in order to maintain the interest of the buyers and prevent PVC-freeness from falling apart in case the claim of environmental friendliness of the product would be questioned.

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<sup>54</sup> Interview with Johan, product development engineer at Coloplast, March 29 2006.

<sup>55</sup> Interview with Mathilde, chief of product development at Coloplast November 7 2006.

### 5.2.1. PVC-freeness as competitiveness

A project with the aim of launching an environmentally friendly urine bag was not just an action of good will. It was closely linked to a particular framing of what qualities would make a product competitive in future markets. Indeed, a significant role was attributed to the PVC-free urine bag in achieving a sevenfold growth target in the middle and high price urine bag segment within five years (Coloplast 1989a, Coloplast 1990j, Coloplast 1988). The bag made of alternative materials was seen as potentially competitive for two different reasons: regulatory pressures on greener products and customer preferences.

As shown in Chapter 4, environment and health related impacts of PVC were debated fiercely in Denmark in the 1980s. One of the ideas entertained by the Minister of Environment, Lone Dybkjær, was an out phasing of PVC. Government agencies, financing bodies, Danish Technology Institute, laboratory equipment and researchers were employed to create methods for calculating and reporting the environmental impacts of PVC and finding possible alternatives to PVC in several different sectors. The medical devices sector was also included in these plans.

Coloplast followed the discussion closely and participated in it through the Danish Medical Device Association (DMDA). By the end of the 1980s, Mathilde (a product development engineer at Coloplast) tells me, it was clear that the PVC-issue would stay on the political and public agenda.<sup>56</sup> Also, the early project documents, a project plan from 1988, an initial specification from 1989, a project application from 1990 and a test report from 1990, reveal that restrictions on the use of PVC were anticipated:

”the past years’ environmental debate where the utensils with PVC have been in focus, can result in tightened restrictions in the area.”  
(Coloplast 1990)

According to my interview persons, the pressure for out phasing PVC formed a strong incentive to rethink the role that PVC had acquired in the production of continence and colostomy products. Besides anticipated customer pull and the co-

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<sup>56</sup> Interview with Mathilde, chief of product development at Coloplast November 7 2006.

worker interest, the PVC debate was one of the major incentives for the idea of PVC free urine bags at the continence care division.<sup>57</sup>

Johan: "the reason behind the birth of this whole project was that Denmark had a very strong Minister of Environment in those years. Lone Dybkjær was the Minister of Environment and already at that time brought pressure on phthalates and plasticizers in general. And then they also started to go for the medical devices or the sterile one-usage market in Denmark. And then it was thought that, well, should we not try to come up with some alternative materials to the bags we produce today."<sup>58</sup> (Translated from Danish by author)

The out phasing of PVC introduced a different framing of competitiveness for future markets than what Coloplast was used to operate with. This framing was extremely strong due to the scale of the anticipated risk related to it: If Coloplast would not be able to come up with a PVC-free product it would, in worst case, not qualify to sell its products in those countries that would introduce a ban. Furthermore, if Coloplast would not act now, it would possibly loose an anticipated first-mover benefit.

Even though the regulatory threat seems to have acted as a major catalyst for developing a PVC-free product at Coloplast, buyer interest was also experienced. In the project proposal from 1988, it was stated that investigations had shown market potential for PVC-free urine bags as professional users and buyers had become more environmentally conscious (Coloplast 1988). Some years later, a test report delivered a similar observation.

"Users and buyers have become more environmentally conscious which can lead to leaving out the PVC products. The increased environmental consciousness amongst politicians and users together with the fact that Coloplast's production process [high frequency welding] can only be used for a limited number of plastic types, has led us to wish to develop a PVC-free bag." (Coloplast 1990)

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<sup>57</sup> Interview with Johan, product development engineer at Coloplast, March 29 2006, interview Mathilde, chief of product development at Coloplast November 11 2006 and interview with Mikkel, chief of commercial development at Coloplast, April 27 2006.

<sup>58</sup> Interview with Johan, product development engineer at Coloplast, March 29 2006.

There were also signals from professional users and procurers in Denmark, Lise, a product manager, and Mathilde tell me. At Coloplast Denmark, the Danish subsidiary of the Coloplast group, the environmental impacts of PVC had been taken up by some hospital procurers and the company experienced increasing attention from especially one hospital, Grenå hospital in Jutland.<sup>59</sup> The end users did not seem to be interested in the PVC discussion:

Mathilde: "The ones that were interested in a PVC-free bag were actually nurses, procurers and some doctors, but it was basically those that were environmentally inclined and it was mostly the professionals. ... We were completely aware that the users were not interested in the environment. They didn't care if it was a PVC-bag."<sup>60</sup>

Lise: "I think the hospitals started to set demands, because we do burn it. And this means that at it went directly into the atmosphere, right."<sup>61</sup>  
(Translated from Danish by author)

According to Mathilde, some of the professional users who affected the public discussion were very much interested in out phasing PVC. These people were mainly procurement officers in hospitals who also had to deal with the defects caused by incineration of PVC in their incineration plants.<sup>62</sup>

In the late 1980s Harry, a product manager for commercial development at the group level, made interviews in several countries in order to find out – amongst other things – what role PVC-freeness played in different countries. According to him, Mikkel and Johan's interest for PVC-free products were only visible in some northern European countries like Denmark, Sweden, Germany and possibly the Netherlands.<sup>63</sup> Mathilde also mentions Switzerland and Austria.<sup>64</sup> However, Johan tells me, product developers in Coloplast anticipated that in case of a Danish ban on PVC also other European countries would follow suit.<sup>65</sup>

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<sup>59</sup> Interview with Mathilde, chief of product development at Coloplast November 7 2006 and nterview with Mikkel, chief of commercial development at Coloplast, April 27 2006.

<sup>60</sup> Interview with Mathilde, chief of product development at Coloplast March 9 2007.

<sup>61</sup> Interview with Lise, product manager at Coloplast, May 17 2006.

<sup>62</sup> Interview with Mathilde, chief of product development at Coloplast March 9 2007.

<sup>63</sup> Interview with Harry, product manager at Coloplast, October 3 2006.

<sup>64</sup> Interview with Mathilde, chief of product development at Coloplast November 19 2007.

<sup>65</sup> Interview with Johan, product development engineer at Coloplast, March 29 2006.

Johan: "We were not so nervous, I think, for all the export markets. But of course there was the EU which caused some nervousness. It caused some nervousness because it could spread to other countries, especially Sweden and Germany were also pretty progressive on the environmental issues at that time."<sup>66</sup> (Translated from Danish by author)

Based on the possible regulative restriction on the use of PVC and the increasing interest amongst professional users and procurers for PVC-freeness, the new bag was seen as something that would strengthen Coloplast's position in relation to its competitors. Coloplast's investigations at home and on the export markets had shown that none of the leading bag producers for the medium and high price segment had PVC-free bags.<sup>67</sup> Coloplast could therefore see business opportunities in developing high quality urine bags that were environmentally friendly. A PVC-free product was envisioned to contribute to the image of the company as an innovative and environmentally conscious enterprise – and help Coloplast become a market leader in the middle and high price segment of drainage bags (Coloplast 1989a).

Here, PVC-freeness was framed and enacted as a quality that enhanced future competitiveness. This was based on the assumption that a regulative restriction of PVC might happen in the near future, and especially in Denmark and some other Northern European countries. Furthermore, some signs of customer interest had been encountered. The competitiveness of PVC-freeness made it a strong product quality. Indeed, it was the very aim of the project on a 500 ml bag to produce a bag of alternative materials. In the following, I will look into how environmental friendliness maintained its stability in the course of the materialization of the product idea.

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<sup>66</sup> Interview with Johan, product development engineer at Coloplast, March 29 2006.

<sup>67</sup> When the PVC-free urine bag project began in 1988, there were PVC-free urine bags in the market in Spain (with PVC tube) and in Denmark. These bags, however, were sold in the low price segment and were thus not seen as competitors for the bag to be developed. However, investigations were made on the Danish producer Svend Anderssen that had bought the PVC-free bag from a company called Deduco at some point in the 1980s. It was estimated that Svend Anderssen did not have an interest in developing high quality materials as a fore runner. Production of these urine bags was stopped at some point in the late 1980s.

## 5.3. Coordinating qualities

Environmental friendliness was not the only product criteria proposed for the "green bag" in the beginning of the development process. At the outset of the project, several ambitions were formulated for the product. Possible product qualities were discussed with user groups consisting of end-users and professional users respectively. This was a way of getting information that Coloplast had used already before with i.e. advisory boards and meetings with users, both professionals and end-users.<sup>68</sup> User groups acted as visionary laboratories: the participants were allowed to come up with all types of product qualities, no matter if they existed some where else or not.<sup>69</sup> Instead of relying solely on the pre-existing assumptions of the user, Mathilde and Lise gave the users themselves a possibility to participate in the configuration of the user and inscription of user roles in the emerging device (cf. Akrich 1992: 208, Callon 1991: 137).

In the discussions with users, it became evident that the most crucial qualities were a minimized noise level of the bag, good smell barrier and a kink-free tube.<sup>70</sup> These dimensions were further elevated in the definition of targets for the project (see for example Coloplast 1990j, Coloplast 1989a)

Mathilde: "And what was really it, when we made the market investigations, was that the most important things for the user is that the material doesn't make noise, that it has a good permeability... and that the tube doesn't kink. That was, according to my memory, how the users looked at it."<sup>71</sup> (Translated from Danish by author)

In the interviews, product developers pointed out that security in use was the most important feature of a urine bag.<sup>72</sup> The durability of contour weldings, connecting weldings between the bag and tubes as well as the flowing speed of urine were therefore important (Coloplast 1989a, Coloplast 1990j). Regarding the strength of

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<sup>68</sup> Interview with Mathilde, chief of product development at Coloplast March 9 2007 and interview with Lise, product manager at Coloplast, May 17 2006.

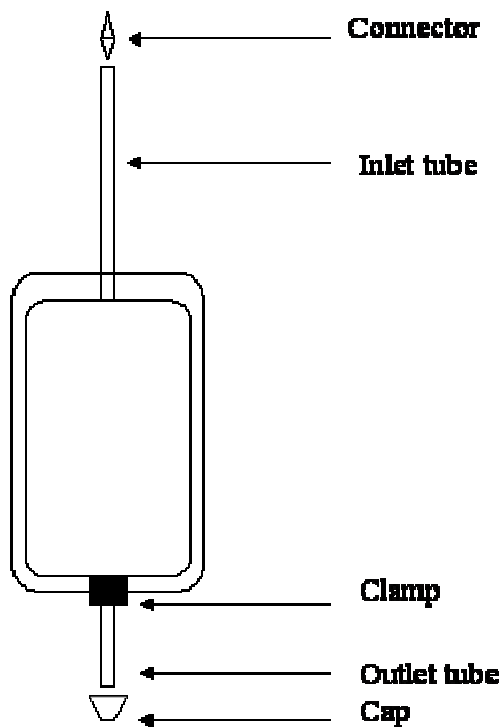
<sup>69</sup> Interview with Lise, product manager at Coloplas, May 17 2006.

<sup>70</sup> Interview with Mathilde, chief of product development at Coloplast November 7 2006.

<sup>71</sup> Interview with Mathilde, chief of product development at Coloplast November 7 2006.

<sup>72</sup> Interview with Mathilde, chief of product development at Coloplast November 11 2006, interview with Johan, product development engineer at Coloplast, March 29 2006 and interview with Lise, product manager at Coloplast, May 17 2006.

weldings and connections, the strength of the foil and out- and inflow speed, it was defined that the bag should fulfil the norms for urine bags set by two different standards: Handicap Instituttet (HI, the Institute for Disabled) and ISO or as in the reference product, the Conveen 5151 urine bag (Coloplast 1989a, Coloplast 1988).



**Figure 2: Main components of Conveen Security+ urine bag (drawing by author, simplified and not in scale)**

The new, green bag was to contain 500 ml and to have both 12 cm and 40 cm inlet tube. In the early project documents the functional features of the bag were defined as similar and at a minimum of similar quality as the already existing Conveen 500 ml urine bag (Coloplast 1989a, Coloplast 1988). The standard bag was emptiable and had a soft non-woven back side, anti-reflux system and a mid-welding that made the urine spread more evenly in the bag. The price was supposed to be in line with that of the PVC reference bag. Furthermore, the bag should fulfil some requirements for storage and packaging and be sterilizable (Coloplast 1989a). Also, the aim was to produce a bag that could be understood by the users.<sup>73</sup>

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<sup>73</sup> Product developers had adverse experiences with a highly complex contoured leg bag which had proven difficult to use and had finesses that made it too expensive. The contoured leg bag was simplified for this reason (Interview Mathilde, chief of product development at Coloplast November 11 2006).

The product developers tell me that they were not supposed to come up with totally new materials, but rather to find the suitable existing materials and combinations with minor adjustments.

Mathilde: "We said that we should try to do it with existing technology, existing materials. We are not going to make some kind of new material development program. Keep it simple and stupid. That was what we aimed for throughout the project. Because if we had to develop a new material with some barrier-capabilities then there would be a timeline that would not match Coloplast at all."<sup>74</sup> (Translated from Danish by author)

Johan: "But there really wasn't anything, it was not that radically new. We didn't work with new materials, they were existing and I would say that it was the supplier that me with the solution. We actually just specified and then we tested."<sup>75</sup> (Translated from Danish by author)

Besides the product related aims, the project of the PVC-free bag also had production technology related goals. It was known from the outset of the project that new production technology would be needed for two reasons: to increase production capacity and to establish technology that could work on PVC-free materials as the old production technology could only work with PVC. Thus, one of the goals of the project became to develop production technology that would allow for flexibility in terms of the materials used (Coloplast 1989a). This was not only important in regard to the bag that was being developed, but also because it was important for it to be able to work with other possible new materials in the future and to have a possibility not to use PVC if needed. At this point, it was known, that this new production technology could not be the same as the one that was used for working PVC, high frequency welding, as high frequency welding could only work a limited number of other materials.<sup>76</sup>

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<sup>74</sup> Interview with Mathilde, chief of product development at Coloplast November 7 2006.

<sup>75</sup> Interview with Johan, product development engineer at Coloplast, March 29 2006.

<sup>76</sup> This interest in new production technology led to cancelling of all PVC urine bag development projects as Coloplast did not want to invest in the technology that would have been needed in order to produce new PVC bags (Interview with Mathilde, chief of product development at Coloplast November 19 2007).



Mathilde:”And if we were to have a new production machine, then we had to make sure that it was a machine and materials, that were also made for the future.”<sup>77</sup> (Translated from Danish by author)

Furthermore, Coloplast was interested in rationalizing and modernizing the production processes. Coloplast was interested in continuous production processes in stead of step by step production in order to rationalize the production process and even solve some problems of efficiency in the old production machinery (Coloplast 1989a).<sup>78</sup>

The product and technology related criteria that were set at the start of the project worked as a stepping stone for the emergence of the new product. However, as the project proceeded, new qualities and requirements emerged in an interplay between different human participants, new materials and old and new components.<sup>79</sup> Some of the predefined criteria, for example the two different preset lengths of the tube, were changed. Also, at one point plans for developing a 750 ml bag appeared even though the project was originally strictly meant for developing a 500 ml bag. Different product qualities became possible as the process continued and the expectations for the product therefore also became more detailed and defined, sometimes even different from the starting point.

Environmental friendliness of the bag required a change of the foil material in the bag, tubes and connector. These materials alone and in combination with each other would need to perform in a way that lived up to the requirements listed above. Not only materials had to be developed – also the bag design and dimensions of its different components had to be adjusted in order to simultaneously enable the green materials and the functionality that was strived for. Furthermore, the new design, new materials and new production technology had to be mutually compatible. Indeed, the product development process acquired a form that Akrich et al. (2002b) have eloquently described in the following way:”innovation takes shape through this rapid movement of incessant backwards and forwards, furthered as in the classical tragedies by the unity of place, which goes from the designer to marketing, from the designer to the software developer.

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<sup>77</sup> Interview with Mathilde, chief of product development at Coloplast November 11 2006).

<sup>78</sup> Interview with Johan, product development engineer at Coloplast, March 29 2006.

<sup>79</sup> This point is also made by Latour, who uses a notion of variable geometry to describe the transformation of an object in the course of a development process (Latour 1991: 116).

The phases are not carefully separated; they are conscientiously mixed up (Akrich et al. 2002b: 213).

Finding new materials and developing new components and adjusting these to each other went hand in hand, one influencing the other. Finding the right materials – and a suitable design – was very much a process of trial and error that was supported by a test- and evaluation programme. This was also recognized by the product developers (see Coloplast 1991d). Indeed, it was these very tests and experiments arranged by Coloplast that made the revelation of these qualities and their details possible (cf. Callon et al. 2002: 199).

As can be imagined, combining the requirement for alternative materials with all the other functional and technical requirements was not unproblematic. Environmentally friendly materials did not always appear compatible with other product qualities on the wish list made by the product development engineers or the marketing staff. The different versions of the product did not coincide in materia. Therefore, on every occasion where PVC-freeness appeared in conflict with any other product quality and coordination (Mol 2002) took place, the stability of this particular version of environmental friendliness was at stake – despite its initial role at the launch of the product development project. Imagine, for example, that the tube made of PVC-free materials would not have ceased to kink. Incompatibilities would then have put PVC-freeness under a trial of strength. Its significance and further existence was thus continuously considered together with the weight and existence of the quality it was juxtaposed with.

During my investigations in product development practices I identified eight incidents where environmental friendliness of the product was not in coherence with other product qualities. The trials of strength resulting from this incoherence dealt with a number of issues ranging from the incapability of the PVC-free material with product qualities like kink-freeness, adjustability in tube length, pre-set tub length and so forth, to the PVC-free material challenging the production of other urine bags made of PVC. Different ways of dealing with these conflicts between qualities were identified by the product developers. I have grouped them into four different categories: making incompatible compatible, privileging either quality over the other and postponing the conflict. Furthermore, enabling the co-existence of conflicting qualities of the PVC-free and the PVC bag in production

by timely and spatial separation is discussed. In the following, I will discuss these trials of strength and the ways PVC-freeness kept or lost its stability.

### 5.3.1. Making the incompatible compatible

The PVC-free material in the in-let as well as the out-let tubes caused some trouble for the product development engineers. It was difficult to find an in-let tube material that did not kink and there were problems in attaching a connector tightly into the tube. Furthermore, the PVC-free material used in the out-let tube was too smooth to keep the clamp in its place. Tensions between the PVC-freeness and other product qualities were evident.

The quest for an appropriate in-let tube material started at the outset of the project in 1989. Several different materials were tested during the next two years (Coloplast 1989b, Coloplast 1990d). However, even though the product engineers found some promising alternatives, no PVC-free material that would not kink sharply was discovered. Commercial development staff grew anxious, and they even considered whether the product could be partly made of PVC.

Lise: "Not being able to solve the problem with the PVC-free [tube] was pretty close... At one point, it was considered, whether a bag half made of PVC could be launched. And we just did not think that was very optimal. But anyway, it was estimated how many of the components could be made PVC-free. And we wished for 100 %, but it could have been necessary to settle for 70 %." <sup>80</sup> (translated from Danish by author)

The product developers, however, did not consider using PVC in the tube – they could see different possibilities that could be investigated.<sup>81</sup> A corrugated tube design was mentioned as one possibility if the desired non-kink quality could not be found (Coloplast 1990d). Development of a kink-free corrugated Polyethylene (PE) tube succeeded and it was decided that it would be used in the green bag. Here, environmental friendliness was *enabled by adding a new feature*, corrugated

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<sup>80</sup> Interview with Lise, product manager at Coloplast, May 17 2006.

<sup>81</sup> Interview with Johan, product development engineer at Coloplast, March 29 2006.

tube design, to the PVC-free tube which made it compatible with another product criteria, kink-freeness. The ability of this new tube not to kink was very strong. It even performed better than any other tube in tests, and even better than tubes made of PVC.<sup>82</sup>

The PVC-free material led to an additional problem related to the interface of the connector and the tube. In December 1990, it was decided that the in-let tube would be made adjustable – this was a wish expressed both by users in user tests and product designers (Coloplast 1990a, Coloplast 1990b). Introducing an adjustable tube meant that the connector came separately and had to be put in its place by the user after shortening the tube (Coloplast 1991g). The old connector from the Conveen standard bag proved to be hard to press into the inlet tube for the users with reduced abilities. When it was pressed too lightly into the tube, the connector leaked.

Mathilde:”...the biggest problem we had, was actually the connector. The one that was inserted into the corrugated tube. It turned out that the users who put it in themselves didn’t have enough motorics, enough strength to insert it sufficiently deep. So they just inserted it loosely and it thus leaked. That was the only thing. It had to be pressed in thoroughly.”<sup>83</sup> (translated from Danish by author)

In order to make the connector easier to press into the tube, Mathilde tells me, product development engineers made the connector smoother and optimized the dimensions both in the connector and the tube so that they fitted better together. If inserted sufficiently hard in the connector it could then keep in its place for some 48 hours or longer.<sup>84</sup> Here, *making incompatible components that in the beginning did not fit together*, in this case the diameters of the tube and the connector, *compatible with each other* enabled the use of PVC-free material, water tightness and therefore an adjustable tube – all at the same time.

However, bags had to be delivered not only with an adjustable tube length but also with a fixed tube length. Here, yet another problem with the PVC-free tube

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<sup>82</sup> Interview with Mathilde, chief of product development at Coloplast March 9 2007.

<sup>83</sup> Interview with Mathilde, chief of product development at Coloplast November 7 2006.

<sup>84</sup> Interview with Mathilde, chief of product development at Coloplast March 9 2007.

material appeared. The non-PVC tube that the connector was pushed into could not keep its elasticity and close permanently tightly around the connector that was pushed inside the tube for long periods of time.

The alternative tube material had a bad "memory" as the product developers expressed it. While working on different designs and attachment methods, in 1992, a new connector was developed replacing the connector formerly used in the Conveen urine bag and planned for the new bag as well. However, the same problems prevailed. Furthermore, a new supplier was used which led to adjustments in the tube material (Coloplast 1992c). Different designs in the corrugations of the tube and the effect of the smooth parts of the tubes were tested in April 1993. None of the alternatives bore fruit but the investigations were continued with other alternative proposals. In April-May 1993, it was decided that for those bags delivered with a permanent connector, the connector would be glued to the tube (Coloplast 1993e). Gluing made the connector adhere firmly.<sup>85</sup> Here, environmental friendliness was *enabled by compensating* the lack of memory in the PVC-free material *with a new mediator*, glue, which made it possible to fulfil the requirement of water tightness and a fixed tube length in a situation where the PVC-free tube did not perform as expected. This way of making two versions of an object compatible resembles what Sjögren (Sjögren 2006: 166) calls mediating and Sjögren and Helgesson call negotiating (Sjögren and Helgesson 2007: 234). Sjögren's and Sjögren and Helgesson's focus, however, is on how ambiguity related to incoherent sources of knowledge is removed from the process of defining the properties of a thing. In mediation, this is achieved by building a new classification with the help of a third type of knowledge. This classification draws from all the different initially incoherent sources of knowledge.

The inlet-tube was not the only thing causing trouble for product developers. The clamp in the out-let tube proved to be challenging as it did not stay in place when opened several times due to the lacking friction in the PVC-free out-let tube material. Again, problems arose in the interface between the PVC-free material and other components of the product.

Mathilde: "The clamp had the problem that when you opened or closed it then it crawled down the outlet tube. This was because the friction on the outlet tube was different from the one on a normal PVC tube. So

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<sup>85</sup> Interview with Mathilde, chief of product development at Coloplast March 9 2007.

the fact that the clamp was opened and closed made it crawl downwards.”<sup>86</sup> (translated from Danish by author)

A solution to this problem was found when the clamp was attached higher up on the tube in the non-woven part in order to secure the clamp from moving down the tube. This time, a PVC-free material, and thereby also environmental friendliness, *was enabled by neutralizing* the adverse character of the PVC-free tube by attaching the clamp to the non-woven part instead of leaving it loose around the tube. Furthermore, the design of the clamp was changed so that it would not pull itself down the tube when closed. These solutions made it possible to obtain security in use even though a tube with less friction was used.

Environmental friendliness, as showed by these examples, was but one of the dimensions of the PVC-free material that is used in Conveen Security+. When these other dimensions emerged and incompatibility with other product qualities arose, the product developers juggled the shape and relation of different parts of the product or added new parts, like glue, to it. This enabled the co-existence of environmental friendliness with other product qualities, like water tightness or security in use. In a sense, the possible conflict between environmental friendliness and other product qualities ceased to realize; the need to coordinate between these was avoided.

### 5.3.2. PVC-freeness privileged over possible user needs

Finding an alternative PVC-free foil for the bag proved to be somewhat easier than finding the tube material. At this point, the only problem was the noisiness of most foils. Altogether 22 different foils were tested in two different rounds for their strength, permeability and noise (Coloplast 1989b, Coloplast 1990c). By the end of year 1990, it was decided that the bag would be manufactured from one of the three foils that had performed in an appropriate way in the tests (Coloplast 1990k). It had been possible to find an alternative material that both complied with the criteria of PVC-freeness and the criteria for strength and permeability set by the standards and the criteria for noise set by product developers. In 1990, the first prototype of a green bag made from PE was tested. The prototype complied with

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<sup>86</sup> Interview with Mathilde, chief of product development at Coloplast November 7 2006.

British Standards (BSI) and the Handikap Institut (HI) standards and requirements for outlet and inlet speed and volume, pulling requirements in BSI and falling test according to HI (Coloplast 1990a). Due to the suitable materials, it seemed that all product requirements could happily co-exist.

After the first test rounds of the foils, the marketing department expressed a wish that the PVC-free bag would be launched in a 750 ml volume in addition to the planned 500 ml. However, problems occurred when testing a 750 ml bag in the falling test. The 750 ml version of the bag could not pass the falling tests in 1990 as the material proved less durable than required.<sup>87</sup> This led to the disqualification of the bag from further development at this stage. The product development engineers, however, anticipated that a 750 ml bag could be possible if the model could be further developed.

Here, sticking to the PVC-free foil presented a trade off between PVC-freeness and those aspirations for larger bags that had been introduced along the way. Because of the lacking strength of the foil, the assortment of PVC-bags grew small. This did not make a big difference in regard to the possible target group for the bags. At that point, Harry tells me, hospitals that in general mainly used large bed bags were not seen as an important client segment.<sup>88</sup> Even the 1500 ml PVC bag in production was mainly used by end-users at home as it was perceived as too expensive for hospitals. Furthermore, both the bags of 500 ml and 750 ml were not considered hospital sizes.<sup>89</sup> Rather than reducing the number of possible target groups, offering a bag in one size only could be a problem for end-users who might have a need for different sizes of the model of bag they were used to. Thus, PVC-freeness was here privileged over possible user needs in an assortment level. Another option, which to my knowledge was not discussed, would have been to change the folio back to PVC which due to its strength would have allowed for larger sizes.

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<sup>87</sup> Interview with Mathilde, chief of product development at Coloplast November 7 2006.

<sup>88</sup> Simultaneously with the 500 ml bag, however, a project on a PVC-free 2000 ml bag for hospital use was started in the early 1990s. (see also Coloplast 1991d). Also here it turned out that it was not possible to produce a non-PVC bag. Here, however, problems were encountered in the production technology. The 2000 ml bag was designed for hospital use which required that the bag could be produced in great amounts and at a cheap price. Developing a technology for this type of use, however, proved to be far too extensive a task and the project was abandoned (Interview with Mathilde, chief of product development at Coloplast November 19 2007).

<sup>89</sup> Interview with Harry, Product manager at Coloplast, October 3 2006.

However, the conflict between PVC-freeness and different sizes was only temporary. In 1997, well after the launch of the Conveen Security+ urine bag, the assortment was amended with two more sizes, 350 ml and 750 ml. A new design for the 750 ml bag enabled the increased volume even though the foil itself had remained the same.

Yet another example of privileging PVC-freeness over user needs is connected to a conflict between safety in use and the clamp, a closing valve in the bottom of the urine bag. Emptiable PVC urine bags were equipped with a clamp. Product designers wanted to use this clamp also in the new PVC-free bag. The bag should have been delivered closed in order to avoid situations where urine could flow freely out of the bag through the open outlet tube if the user forgot to close the clamp. This, however, proved to be difficult, as the PVC-free outlet tube could not return to its shape after it had been pressed together by the clamp because of the lacking "memory" of the material.<sup>90</sup>

Mathilde: "We could not deliver it [the clamp] closed. One of them was that if you closed the clamp you would squeeze the tube. And if you squeeze it then the inner walls in the tube will meet. When you then have to open it again, then they will not come apart if they have been there for several months. The tube does not have a good enough memory."<sup>91</sup> (translated from Danish by author)

It was decided that the clamp would be delivered open. Again, the tension between PVC-freeness and another product quality is solved by a trade-off. This time, another product quality is compromised in order to keep the PVC-free tube, and therefore environmental friendliness. *Environmental friendliness is privileged over security in use* when taking the bag into use.

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<sup>90</sup> Interview with Johan, product development engineer at Coloplast, March 29 2006.

<sup>91</sup> Interview with Mathilde, chief of product development at Coloplast March 9 2007.



### 5.3.3. Postponing the coordination between environmental friendliness and user satisfaction rate

The prototypes of the PVC-free bag went through the usual user tests where the functionality of the device was assessed by end-users. Following Grint and Woolgar (1997: 79), the user tests acted as an event where the compatibility of the user that had been configured in the product and the user in flesh and blood and daily routines could be examined.<sup>92</sup> In the basic specification document, the success criteria for the functionality test had been defined for the PVC-free bag to be factor 60 or more. This meant that 6 out of 10 test persons would prefer the new bag rather than the reference product, the Conveen 5151 bag. This level of acceptance had to be reached on each tested parameter, i.e. connection to urisheath (a condom catheter) or catheter or noise. The bag should as a minimum receive the same user acceptance as the existing bag (Coloplast 1989a, Testreport. Fase II test 16.12.1990).

The corrugated tube proved to be a weak link in the bag as some perceived it as too sturdy and uncomfortable (Testrapport. Fase II, test 1 6.12.1990). Regarding the other appraisal parameters the bag performed well, at times even better than the reference product, the Conveen urine bag (Coloplast 1990a). Despite of this, the overall acceptance of the product was not good enough according to the set norms. All in all, only 45% of the users preferred the new bag. Despite the preset success criteria this was agreed to be sufficient because the bag was PVC-free (Coloplast 1990a).

”The accepted norm for the criteria of success is 60%. If 4 users had preferred ”no difference’ on question 13 ”all in all’ instead of the standard bag then the criteria of success had been fulfilled. Considering the above mentioned concerning the two users that had experienced an episode, and the fact that we already knew that the tube was too thick, implies that we can consider the test of functionality as acceptable. We can allow ourselves to do that because it is PVC-free and because the users did not know about it. Had it been an updated PVC bag then the

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<sup>92</sup> In this case, as shown before, users had already been involved in the product development and had thus participated directly in configuring the user into the product.

testresult would not have been acceptable.” (Coloplast 1990a)(translated from Danish by author)

PVC-freeness and possibly the unfinished character of the bag were treated as compensating for the results that did not live up to the preset success criteria. Furthermore, my interview persons state that despite the slightly disappointing conversion rate, the team believed that the product was good and could be developed further and thus gain more popularity amongst the users.

It was decided that another user test would be carried out after the product would have been further developed. By accepting the product for further development, the preset frame for calculating the acceptability was questioned: it did not include environmental friendliness which was now assumed to make a difference in terms of user appraisals. It is interesting that the product developers already anticipated that the greatest interest in PVC-freeness would not come from the end-users but rather from the professional users and procurers. Furthermore, it seemed that the product developers had plans on remodelling one of the problem points, the tube that was perceived as indiscreet. The anticipated reshaping was used to bracket (Mol 2002: 64) one of the failures out of the test results and to rule out a trade off between the PVC-free tube and the user satisfaction. In this way, the closure of the user test was *postponed*. Thereby an active conflict between PVC-freeness and user satisfaction was avoided even though the tension between these prevailed and the conflict remained unreconciled. Postponement is similar to Sjögren’s concept of delaying (Sjögren 2006: 170-71) decisions when it is not possible to remove ambiguity related to different sources of knowledge about an object. Here it is not the knowledge but rather the discrepancy between expectations and test results that leads to postponement of relating these to each other.

In April 1991, a phase II test 2 was carried out on a further developed version of the urine bag. This time the reference product was the product the end-users currently used. The test product had been changed slightly and now had a new adjustable inlet tube. The now corrugated tube had three smooth parts that made it possible for the user to shorten it to 45, 40 and 35 centimeters (Coloplast 1991g). The clamp had been changed in order to keep the lid tighter on (Coloplast 1991g). The acceptance norm for this testing was that users would place the product in one of the three best evaluation categories (very satisfying, satisfying or neutral). The success factors for the different product features as well as for the product as a

whole should be at least 60 %, meaning that at least 60 % of the test persons would find the bag acceptable. This time the bag fulfilled the acceptance criteria on all the assessment parameters. The product and all the product features were very well received and the product as a whole scored a rating of 75 % or more (Coloplast 1991g). The in-let tube had now been made adjustable which most probably removed the problem of indiscreetness. The co-existence of an environmentally friendly tube material and user satisfaction was enabled by making the dimensions of the tube adjustable and thereby avoiding an excessive tube length. The bag had been adjusted to the reconfigured user in a way that made it possible to maintain the PVC-free tube-material.

#### 5.3.4. Bringing environmental friendliness and environmental harmfulness into co-existence through separation

When test-marketing of the green bag was planned, an existing PVC-bag production machine had free production capacity. In order to start production of the PVC-free bag, it was decided that the old machine would be remodelled to produce both the contoured bag and the new 500 ml PVC-free bag (Coloplast 1990f). However, the coexistence of products made of environmentally friendlier and more harmful materials caused some friction in the production machinery. As previously mentioned, Coloplast's old urine bag production machines were only able to work PVC – in principle. Rebuilding was required in order to work the PVC-free foil in addition to PVC foils which required substantial investments.

Mathilde: The plan from the beginning was actually that we should have a new machine. But since we were a little uncertain if the product would sell or not and since there was spare capacity on the old production machine and because production only took place using one shift, where you could increase to three shifts, then a decision was made that it should just be produced on the old machine.”<sup>93</sup> (translated from Danish by author)

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<sup>93</sup> Interview with Mathilde, chief of product development at Coloplast November 7 2006.

The reason for attempting to rebuild an old production machine was the investment policy for new technologies. In the early 1990s, the investment policy defined that before new machines would be ordered there ought to be a clear understanding of the demand for the product. Test marketing products were often produced almost manually and launching could happen with semiautomatically produced products only in few countries simultaneously.<sup>94</sup> The investment policy, then, forced the two different materials on the same production machine despite the technical incompatibility of the existing machine.

The rebuilding of the machine was done in a way that it could work both PVC and non-PVC materials in shifts, that it could accommodate different designs and that it could change between different designs and materials. Technique and technology was changed from high frequency welding to warm welding in order to be able to work the new materials. PVC and the chosen PE based foil required differing welding temperatures which made it necessary to include an adjustment possibility in the technology (Coloplast 1991d). Besides accommodating different models, materials and working temperatures for these two bags, the production process of the green bag was also more complex in itself (Coloplast 1991d).<sup>95</sup>

In the interface between the machine and the materials, the coexistence of two different materials was achieved through timely separation and by reformatting the production machine. Timely separation made it possible to avoid the coordination and conflict between these materials – to a certain extent.

However, changing between the different production modes was not unproblematic. Changes took a lot of time and the waste percentage was high. Despite several adjustments in the process, working the two materials on the same machine remained difficult (Coloplast 1992c, Coloplast 1993b).

Separating the materials through shift wise production, however, produced yet another type of friction: high price.

Mathilde: "I think we threw 1 Krone after each bag we shipped out"<sup>96</sup>  
(translated from Danish by author)

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<sup>94</sup> Interview with Mikkel, chief of commercial development at Coloplast, April 27 2006.

<sup>95</sup> Interview with Mathilde, chief of product development at Coloplast April 16 2007.

<sup>96</sup> Interview with Mathilde, chief of product development at Coloplast November 7 2006.

Producing the PVC-free bags with a financial loss was acceptable as this was considered a market test: if the products would sell, a new machine would be built for and dedicated to PVC-free bags.

The problematic co-existence of PVC-freeness and PVC on the same machine only came to its end when, after lengthy investments and demand- and production capacity calculations, Conveen Security + bags got their own production machine in 1993. From then on PVC and PVC-free materials became spatially separated and distributed in different localities. The new machinery was finished in the very last minute before the production capacity was exhausted.<sup>97</sup> In 2002, yet another machine – now also for the production of another PVC-free series, Moveen drainage bags – was built (Coloplast 2002). The introduction and application of the new production technologies and production processes enabled a production of an environmentally friendlier product in a industrial scale which was one premise for its existence as a sellable and buyable object.

## 5.4. PVC-freeness stabilized

As we have come to see, PVC-freeness as a product quality did find stability in the product development and production technology development process. Carrying out a product development project on an environmentally friendly product introduced a whole new quality to Coloplast's urine bag assortment. Carrying out the project *brought PVC and PVC-freeness, environmental harmfulness and environmental friendliness into co-existence within the same product group*. In terms of new developed products, the project stroke a more radical note: environmentally friendlier materials substituted those that were more environmentally harmful. While PVC bags were still produced, all the product development was carried out on PVC-free materials. *Environmental friendliness was privileged over environmental harmfulness*.

The durability of the enactment of environmental friendliness as PVC-freeness can also be seen in the development of the next – and latest – series of urine bags,

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<sup>97</sup> Interview with Mathilde, chief of product development at Coloplast November 7 2006.

Moveen.<sup>98</sup> When Moveen bags were developed at Coloplast starting from the mid 1990s, it was evident from the start that all products in the Moveen series would be PVC-free.<sup>99</sup> Indeed, Coloplast has not developed any PVC urine bags since 1986 when the contoured leg bag was developed.<sup>100</sup>

My interview persons raise several issues that might have supported PVC-freeness in maintaining such stability. First of all, as discussed in the beginning of this chapter, anticipated regulatory restriction strengthened the impetus of PVC-freeness. During the development of Moveen and even later, an anticipated regulatory change was still an issue, according to Mikkel, Paola (product managers), and Carsten (marketing assistant).<sup>101</sup> Even though the ban on PVC had not been passed in any country, Mikkel saw its realization as merely a question of time. The political threat was thus still seen as a good reason for sticking to PVC-free materials.

Satu: “Why [Moveen], if PVC wasn’t the big thing anyway?”

Mikkel: “Because we held on to that it had to come [the substitution of PVC]. There was a clear faith in that it will come. And as time passed by we became so comfortable with the foil that it was OK.”<sup>102</sup>  
(translated from Danish by author)

Satu: What role did PVC-freeness play when you came in [1998]?

Carsten: “There was very much attention on that thing. That regulations could come so you had to be able to deliver PVC-free.”<sup>103</sup> (translated from Danish by author)

Mathilde brings out yet another argument for Coloplast’s remaining with PVC-free materials. Aside from not wanting to invest in environmentally harmful materials, going away from PVC-free materials would have resulted in a strategic decision of

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<sup>98</sup> Moveen is a series of drainage bags especially developed for wheelchair users with limited dexterity.

<sup>99</sup> Interview with Mathilde, chief of product development at Coloplast November 11 2006 and interview with Carsten, Marketing Assistant at Coloplast, November 23 2006.

<sup>100</sup> Coloplast group has, however, overtaken some PVC-bag through acquisition of other firms in the continence care field.

<sup>101</sup> Interview with Carsten, Marketing Assistant at Coloplast, November 23 2006 and interview with Paola, Product manager at Coloplast, May 15 2006.

<sup>102</sup> Interview with Mikkel, chief of commercial development at Coloplast, April 27 2006.

<sup>103</sup> Interview with Carsten, Marketing Assistant at Coloplast, November 23 2006.

going back to the "old" type of production technology that could not work other materials than PVC. Mathilde provides two examples of this, one concerning the reasons behind the decision to make Moveen PVC-free and another regarding the out phasing of a standard Coloplast bag from some markets following the launch of Conveen Security+. According to Mathilde, one of the reasons for using a PVC-free material in Moveen was reluctance to invest in "old fashioned" production technology and the willingness to keep to the new type of production technologies that had been introduced during the development of Conveen Security+. These technologies were more flexible in terms of what materials could be used.

Mathilde: "What materials and how they were chosen, that was open from the beginning. Sure, it couldn't be PVC. At that point in time we did not want to invest in old environmentally harmful materials. Or in old [production] technology."<sup>104</sup> (translated from Danish by author)

Following the launch of Conveen Security+, yet another situation occurred that showed the importance of production technology in stabilizing the use of PVC-free materials. The demand for Conveen urine bags made of PVC had increased and the production capacity for this type of bag had nearly met its limit. Instead of building a new machine for the Conveen urine bags it was decided that in some countries (Sweden, Norway, UK and possibly the Netherlands) Security+ was to substitute the 500 ml Conveen urine bag within one year. Simultaneously with the launching of Conveen Security+ urine bags, some countries were thus denied to continue selling the Conveen 500 ml PVC-bag which caused some commotion. According to Mathilde, the reason for privileging Conveen Security+ was the commitment of the management to invest in more flexible technology.<sup>105</sup> This, again, had major implications for the relation between PVC and PVC-free urine bags: suddenly, although not for environmental reasons, the environmentally friendlier alternative was privileged over the other. Thereby, producing a bag of non-PVC materials was – once again – privileged over user needs.

PVC-freeness has also been supported by internal policies at Coloplast. According to Paola, Carsten, Mathilde and Joakim, PVC-freeness has been integrated into Coloplast's internal policies in the shape of environmental policies and targets.

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<sup>104</sup> Interview with Mathilde, chief of product development at Coloplast November 7 2006.

<sup>105</sup> Interview with Mathilde, chief of product development at Coloplast November 7 2006.

Paola:”To try to reduce the use of PVC, so I actually think that you would really need to go into Coloplast’s environmental policy, what the goal was, and that way you could see, why the products were PVC-free.”<sup>106</sup> (translated from Danish by author)

Satu:”The fact [that your new products are PVC free] is a political decision in some way?”

Mathilde:”Yes, you could say that it is an overall environmental policy decision. That is, it was the head of division that kind of left his footprint here.”<sup>107</sup> (translated from Danish by author)

Carsten:”That some environmental targets for the production have been set for each year that have to be improved. That is why you can say that if you have already accomplished most of the thing about being PVC-free, in a new project, then you can also do it.”<sup>108</sup> (translated from Danish by author)

Because of Coloplast’s DEHP-free policy from 2003, the PVC-free bags that are also phthalate-free make a solid case for themselves when the urine bag assortment is revised and new and old models are positioned against each other according to their qualities.<sup>109</sup> According to Joakim, a phthalate-free bag will be privileged over a PVC-bag if there is a need to rationalize the product assortment.

Satu:”is there such a demand for PVC free products that some would say, OK we want this PVC free bag?

Joakim:”No, but Coloplast has the policy that we want to have this. So we would never, never close it [Conveen Security+ urine bag] to the advantage for one that contains PVC. Because our policy is that we would prefer to have all our products without PVC. So that is the way it is going towards. And that will also be in the picture when we look at which programs, what are we going to do, which way are we going. So it would be one of the most significant decision-making criteria... Now

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<sup>106</sup> Interview with Paola, Product manager at Coloplast, May 15 2006.

<sup>107</sup> Interview with Mathilde, chief of product development at Coloplast November 7 2006.

<sup>108</sup> Interview with Carsten, Marketing Assistant at Coloplast, November 23 2006.

<sup>109</sup> As a result of Coloplast taking over two large urine bag producers, Mentor in 2006, and SSL in 2000, the amount of different urine bag models has increased and reviewing of the urine bag assortment has become increasingly relevant (Interview with Joakim, Product manager at Coloplast, June 12 2006).



I am saying PVC free, it might be that it really is phthalate-free. And maybe more so than PVC.<sup>110</sup> (translated from Danish by author)

However, the phthalates are predominantly interesting as for their anticipated health related impacts, not those related to the natural environment.<sup>111</sup>

The reasons for sticking to PVC-free materials are manifold. Risk adverseness in terms of national politics seems to have lost some impetus in comparison to the 1980s, yet the possibility of a ban was still considered during the development of Moveen. The problematization of PVC as a material was persistent. Furthermore, new issues have gained weight in regards to the stability of PVC-freeness within Coloplast. First of all, production of new bags requires specific production technology that has been specifically designed for the bag models in question and for their materials. Returning to PVC would thus also signify a return to the old type of technology. Secondly, environmental questions have become part of the company policy which adds further impetus to the stabilization of PVC-freeness as a product quality. PVC-freeness is – on top of this – supported by a strategic decision to prioritize phthalate-free products – even though this is mainly done due to the health effects of phthalates. PVC-freeness has become part of the manifold networks and human-material constellations within Coloplast.

The existence of environmental friendliness as a product quality is no longer, or at least not to the same extent as earlier, a question of gaining an anticipated competitive edge by reaching out to networks (to be) woven in other places, markets. Now, it has become part of the way machines work and the way people work the machines, part of the way the business principles are enacted and part of figures of how much what kind of materials should be used. Inside Coloplast, environmental friendliness has acquired some state of irreversibility and normalization in a form of PVC-freeness, to use the words of Callon (Callon 1991: 151).

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<sup>110</sup> Interview with Joakim, Product manager at Coloplast, June 12 2006.

<sup>111</sup> Interview with Paola, Product manager at Coloplast, May 15 2006 and interview with Joakim, Product manager at Coloplast, June 12 2006.

## 5.5. ... And PVC-freeness destabilized

As we have seen, PVC-freeness has acquired a considerable amount of stability in product development and production. Even though the possibilities to develop and make a PVC-free product were contested it remained a product quality – and even to an extent where other qualities had to be compromised or rearranged in order to accommodate it. However, the stability of PVC-freeness was also contested in other ways. PVC-freeness thus entered into a trial of strength in relation to the competitiveness of Coloplast's other products made of PVC.

Besides the projects on PVC-free drainage bags, Coloplast proceeded in developing a Polyvinylidene-free (PVDC) colostomy bag. Colostomy products were Coloplast's largest business area.<sup>112</sup>

Mikkel: "It wasn't only urine bags. The need was far greater in the colostomy division, that was what the whole company lived from. So there was a lot of concern about making a PVC free bag. But that hasn't really happened yet. But that was where the real fear resided."<sup>113</sup> (translated from Danish by author)

While the PVC-free urine bag started to take shape, the attempt to find alternative materials for colostomy bags proved to increasingly difficult.<sup>114</sup> The crucial point with colostomy bags was permeability: it turned out to be impossible to develop a foil that could functionally perform at the top level and at the same time be able to keep the odors inside the bag.<sup>115</sup> As it became clear that the development of a PVDC-free colostomy bag had failed, the fate of the PVC-free urine bag project was at stake too.<sup>116</sup> Some persons in Coloplast, including the top management at

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<sup>112</sup> Interview with Mathilde, chief of product development at Coloplast November 7 2006.

<sup>113</sup> Interview with Mikkel, chief of commercial development at Coloplast, April 27 2006.

<sup>114</sup> Interview with Johan, product development engineer at Coloplast, March 29 2006 and interview Mathilde, chief of product development at Coloplast March 9 2007.

<sup>115</sup> Interview with Mikkel, chief of commercial development at Coloplast, April 27 2006.

<sup>116</sup> According to an evaluation report on the Program for Cleaner Technology from 1995, it had by January 1994 after a prolonged development period been possible for Coloplast to produce a PVDC-free bag foil and bag which lived up to the functional requirements, including permeability. However, as changing the production machinery would be expensive and since the PVC-debate had calmed down, the enterprise had chosen to wait until there would be an actual requirement to do so (Jørgensen and Høier 1995: 21-22). This, however, was only after the launch of ConveenSecurity+.

the group level, saw PVC-free products as potentially harmful to Coloplast's other PVC products, especially the colostomy products.<sup>117</sup>

Satu: Was this already before the development had started or not until later?

Mathilde: "It didn't succeed with the PVC free colostomy-bag. The closer we came to launching a PVC free urine bag the more they started to say: what does this mean to the rest of Coloplasts' products."<sup>118</sup>  
(translated from Danish by author)

Here, the basis for calculating competitiveness brought overflows (Callon 1998a: 252) to the framing of PVC-freeness. Besides being possibly a very competitive product at the drainage bag market, the leadership of the company articulated that the green bag could jeopardize Coloplast's competitiveness in other, far more significant business areas. The PVC-free urine bag could become a poisonous arrow through its ability to set an issue on the agenda that not all the procurers and users were aware of. The green bag could thus make overflows visible in the frame of calculations when a PVDC-colostomy bag was purchased. PVC-freeness as a source of growth potential and competitiveness was problematized.

However, as a result of negotiations with the management of the continence care division, the top management agreed on continuing the project on PVC-free drainage bags.

Mathilde: "Here I think that the head of division, who was our director, he more or less said that let's just try and develop this. Let's just see. Tried to say that if we get the product then we have to consider what to do when we are going to launch the product so as not to harm our current PVC products. That was more or less how the head of the division sold it."<sup>119</sup> (translated from Danish by author)

The director of the continence division was able to frame the bag project as a development project that could be discussed again if it succeeded. The conflict

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<sup>117</sup> Interview with Mathilde, chief of product development at Coloplast March 9 2007.

<sup>118</sup> Interview with Mathilde, chief of product development at Coloplast March 9 2007.

<sup>119</sup> Interview with Mathilde, chief of product development at Coloplast November 7 2006.

between environmental friendliness and the over all competitiveness of Coloplast's products was temporarily avoided by *postponing the coordination of these qualities*. Furthermore, Mathilde tells, receiving external financing from the Council for Recycling and Clean Technology to a shared project on environmental impact analysis, economic assessment and production of a PVC-free urine bag with the Danish Technical Institute in 1990 was clearly an incentive for continuing the project, although it was considered potentially problematic to other Coloplast products.

At this point, Coloplast also started a more systematic approach to environmental management with the director of the continence division as head of the project. Mathilde points out that the environmental policy and work was seen, amongst other issues, as something that could provide security for the overall competitiveness of the firm by explaining how Coloplast worked with environmental issues – even though it also had PVC and PVDC products in its product assortment.<sup>120</sup>

Mathilde: "It was also easier to launch a PVC free bag when you at the same time had an environmental policy which kind of said how we actually dealt with environmental issues. If people come and beg us to launch a PVC free bag, but you still have colostomy bags and urine bags made of PVC, how can you actually do this? Then we can say that here we have an environmental policy that describes what we do."<sup>121</sup>  
(translated from Danish by author)

The PVC-free urine bag project continued. Meanwhile, Coloplast was also an active part in the PVC-discussion in its branch organization, The Danish Medical Device Association (DMDA). In DMDA, in order to avoid a situation where PVC would be banned, the chief of the division from Coloplast tried to steer the discussion towards possibilities within reach and apparent limitations for substituting PVC.

Mikkel: "The chief of division, he sat in the trade organisation, Medicoindustrien, he was very close to the trade organization's involvement in the PVC debate and a lot of resources were used via the

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<sup>120</sup> Interview with Mathilde, chief of product development at Coloplast March 9 2007.

<sup>121</sup> Interview with Mathilde, chief of product development at Coloplast March 9 2007.

trade organisation on informing politicians and markets about PVC. And we were of course involved in that communication campaign. So, we simply said be careful that you don't just shoot at PVC as the big bad guy because other foils actually have equally many harmful consequences, they are just not as known. Firstly and secondly is that it is actually under very special circumstances that dioxin can develop, special temperatures etc. It is not just only because PVC is burned. And I remember that we were involved in formulating that kind of argumentation.”<sup>122</sup> (translated from Danish by author)

Mathilde:”If it happened that a ban against PVC in urine bag came, then we would have an advantage over others. And that was possible. But it wasn't the case that we wanted it to come, it would then cause other problems in other areas. But we wanted to be proactive by cooperating and finding some possibilities, alternative solutions where it was possible to find them. You are then better positioned in the discussion with the authorities when you say that you have solved some of the PVC problems.”<sup>123</sup> (translated from Danish by author)

The threat posed by PVC-freeness to other products was appraised once again upon test marketing and launch in Germany in 1992. When the product was test marketed, a top management decision not to use the word PVC-free was communicated to the German subsidiary.

Mikkel:”We were afraid to stir the debate that would then hit us in the colostomy bags. And that was the reason why we said, low profile on this. Because many of the customers had no idea there was a PVC problem, why should we then introduce it to them. That is not our role as a commercial supplier.”<sup>124</sup> (translated from Danish by author)

This same marketing strategy applied to the launch of the bags in other countries.

Mathilde:”I don't quite know when and how early they started to discuss it, but when we were about to launch it we were not given

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<sup>122</sup> Interview with Mikkel, chief of commercial development at Coloplast, April 27 2006.

<sup>123</sup> Interview with Mathilde, chief of product development at Coloplast November 19 2007.

<sup>124</sup> Interview with Mikkel, chief of commercial development at Coloplast, April 27 2006.

permission to launch it as PVC free.”<sup>125</sup> (translated from Danish by author)

Lise:”Because all of a sudden I think there was something that we couldn’t say that it was PVC free.”<sup>126</sup> (translated from Danish by author)

This was in sharp contrast to earlier marketing plans. In earlier documents PVC freeness had been mentioned as the foremost marketing argument besides the functional aspects of the product, i.e. the adjustable tube length, a kink-free tube, soft backside and possibility to empty the bag. Furthermore, in the Design Review Document 1990, it had been evaluated that if it would not be possible to characterize the bag as PVC free, ”cannibalization” of the old bag could be expected (Coloplast 1990a).

In the Design Review Document 1990, the target group for the new bag was defined as environmentally conscious users, nursing homes and official sales channels where there was a need for a PVC free bag (Coloplast 1990a). Even as close to launching as June 1992, PVC-freeness had still been part of the marketing plans. In June 1992, Harry (commercial development) prepared a product documentation folder, a so called launch binder, for internal use during launching and selling of the bag.<sup>127</sup> It included a product data sheet, product information and information on the market conditions. In the launch binder, Conveen Security+ was presented as a ”new generation urine bag”. Amongst others it was (Launch binder 1992):

”made from PVC-free materials”

”when incinerated the product will not harm the environment”

Environmental friendliness was mentioned as a reason for the development of the product:

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<sup>125</sup> Interview with Mathilde, chief of product development at Coloplast November 7 2006.

<sup>126</sup> Interview with Lise, product manager at Coloplast, May 17 2006.

<sup>127</sup> Interview with Harry, Product manager at Coloplast, October 3 2006.

”The reason for developing this new urine bag made of PVC-free materials was to address an ever increasing concern for the environment”. (Launch binder 1992)

Despite these marketing plans, the group level did not encourage the national subsidiaries that were in charge of the national level sales to market it as PVC-free. Even ”Rundt om Coloplast”, the internal magazine of the Coloplast company, does not write anything about the environmental qualities of the product when it informs about the test marketing. Again, it was the top management who assessed using PVC-freeness as too risky for Coloplast’s other PVC products, especially in relation to colostomy products with PVD (Polyvinylchloride).<sup>128</sup> A focus on PVC-freeness could accelerate the PVC-discussion and make it difficult to justify the production of Coloplast’s PVC products. This risk was thought to be especially pronounced in countries with no previous public discussion on the issues related to PVC.

Mikkel:”It was an assessment that was very much in, meaning that launching a product on the continence market can ignite a fire that can hit us in the neck on the colostomy market.”<sup>129</sup> (translated from Danish by author)

Harry:”Our dilemma was that if we started to talk too much about the PVC freeness then we would shoot ourselves in the foot. And that we are not interested in, so it is correct, and that was of course something our subsidiaries mentioned, because for them the urine bags is not a secluded world, that is not how it works.”<sup>130</sup> (translated from Danish by author).

The frame for calculating the competitive benefits of PVC-freeness had now changed. Instead of restricting the calculations around one product only, the competitiveness of PVC-freeness was approached in a frame that included a majority of PVC products. As an interesting linkage to the previous chapter, it can be stated that as the anticipated ban or restriction on PVC had not been issued, the

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<sup>128</sup> Interview with Mikkel, chief of commercial development at Coloplast, April 27 2006, interview with Mathilde, chief of product development at Coloplast November 11 2006 and interview with Harry, Product manager at Coloplast, October 3 2006.

<sup>129</sup> Interview with Mikkel, chief of commercial development at Coloplast, April 27 2006.

<sup>130</sup> Interview with Harry, Product manager at Coloplast, October 3 2006.

basis for calculating the competitiveness of a PVC-free product had changed radically. PVC-freeness did not act as a prequalification criteria as once supposed. The risk related to PVC as a product material had not been realized during the years of product development. PVC-freeness became destabilized as a product quality.

According to Harry, other reasons for not mentioning PVC-freeness might have been that it could be seen as a sign of worse quality from the customer side especially in those countries where PVC-related problems were not discussed.<sup>131</sup>

The main sales arguments were related to the functionality of the bag.<sup>132</sup> Especially kink-freeness had proven to be a popular feature amongst users during the test marketing in Germany.<sup>133</sup>

Harry: "The [main sales argument] was more that with the tube that could be shortened and that it was kinkfree and those kinds of things. And the soft materials."<sup>134</sup> (translated from Danish by author)

Lise: "And then we had those arguments about it being secure in-use, easy and comfortable and soft. That was the way we did it."<sup>135</sup> (translated from Danish by author)

In its test marketing, launch and marketing strategies, the group level at Coloplast level drew a very clear line: the distinction between environmentally friendly and harmful was not explicitly enacted through referring to PVC-freeness in the marketing materials. However, that the product was made of environmentally friendlier materials than PVC could be mentioned in the locations, where there was an interest for it.<sup>136</sup>

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<sup>131</sup> Interview with Harry, Product manager at Coloplast, October 3 2006.

<sup>132</sup> Interview with Harry, Product manager at Coloplast, October 3 2006, interview with Lise, product manager at Coloplast, May 17 2006 and interview with Mathilde, chief of product development at Coloplast November 7 2006.

<sup>133</sup> Interview with Mathilde, chief of product development at Coloplast November 19 2007.

<sup>134</sup> Interview with Harry, Product manager at Coloplast, October 3 2006.

<sup>135</sup> Interview with Lise, product manager at Coloplast, May 17 2006.

<sup>136</sup> Interview with Harry, Product manager at Coloplast, October 3 2006, interview with Mikkel, chief of commercial development at Coloplast, April 27 2006 and interview with Mathilde, chief of product development at Coloplast November 7 2006.



Harry: "It was mentioned by the sales people as far as I remember, but as we talked about before, then it was not the most significant argument, that was the quality of the product itself. And then it was a plus that the product was PVC free. So it was not, where we in the beginning perhaps had thought that now we were going to make that PVC free bag and that is important and that is what we should focus on. That was toned down in relation to the functionality and quality of the bag. And then in those countries where it meant something it was of course mentioned and discussed, but not as the most important feature of the bag."<sup>137</sup> (translated from Danish by author)

Marketing materials were not produced for devices that would carry the distinction between PVC and PVC-free around the world. Something else should initiate the distinction. By taking this stance, Coloplast *privileged the competitiveness of its total product assortment over environmental friendliness* in marketing. The friction in the co-existence between environmental friendliness and environmental harmfulness could not be solved by separation, like in the production of the bags. Instead, one of the qualities in this distinction had to be backstaged and delegated to the periphery. Akrich et al. (2002a), have convincingly shown how the adoption of a newly materialized innovation is dependent on the mutual adaptation of the product and the public (Akrich et al. 2002a: 203). This case, however, shows yet another arena where adaptation might be required in order for the innovation to sustain, namely the producing company. Even when the material incompatibilities have been successfully settled, the innovation – environmental friendliness in this case – can be contested within the very company.

Besides destabilizing environmental friendliness as a product quality, this decision, however, came to stabilize something else as well. The introduction of a product that could potentially be marketed as environmentally friendly led to a situation where environmental policy and marketing strategy of the enterprise had to be related to each other. Through Conven Security+, a distinct and separate boarder and role definition of these two realms was formed. Rather than overlapping with marketing, environmental policy was now restricted to deal with environmental friendliness as a concern internal to the enterprise – even though the set environmental targets themselves reached out to cover the whole lifecycle of the product.

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<sup>137</sup> Interview with Harry, Product manager at Coloplast, October 3 2006.

## 5.6. Conveen Security+ in Denmark

Conveen Security+ was launched on the Danish market by Coloplast Denmark in 1993 and became the only PVC-free urine bag on the Danish market.<sup>138</sup> Upon launch, the responsibility for marketing was taken over by Coloplast Denmark as a subsidiary. According to Gerhard, a marketing assistant, Conveen Security+ has had a stable growth rate since launch.<sup>139</sup> The bag was sold to hospitals by Coloplast's sales consultants and to the community sector by trading companies. At this point, Gerhard tells me, hospital sales were accomplished by direct sales, not calls for tenders which have been and increasing tend in the past years.<sup>140</sup>

Upon launch of Conveen Security+, Coloplast Denmark sold Coloplast drainage bags made of PVC in different sizes: 500 ml, 800 ml and 1000 ml. According to Kirsten, a product line manager, Coloplast was a market leader for urisheaths whereas urine bags were a rather marginal product group in the continence business area.<sup>141</sup> Therefore, rather than marketing urine bags as a separate business area, they were marketed in combination with the well-selling urisheaths. Together the bags and the urisheaths formed a complete drainage system. The Conveen Security + drainage bag was launched together with a latex-free Conveen Security+ urisheath. According to Gerhard, the main strategy for urine bags was to make professional users and end-users aware of their possibility to choose between urine bags and diapers.<sup>142</sup> In 1993, colostomy products were the largest business area for Coloplast in Denmark<sup>143</sup>

At this point, as discussed in the previous chapter, the plans to out-phase PVC had evolved into an agreement that focused on recycling PVC. No particular recycling targets were set for medical devices. However, according to Gerhard, Kirsten, Mathilde, Karin (a sales consultant) and Mikkel from Coloplast Denmark,

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<sup>138</sup> In 1980s there had been a urine bag produced by Svend Anderssen the production of which, however, had stopped.

<sup>139</sup> Interview with Gerhard, marketing assistant at Coloplast June 21 2006.

<sup>140</sup> E-mail correspondence with Gerhard, marketing assistant at Coloplast 27 June 2007.

<sup>141</sup> Interview with Kirsten, Product line manager at Coloplast, October 9 2006.

<sup>142</sup> Interview Gerhard, marketing assistant at Coloplast June 21 2006

<sup>143</sup> Interview with Kirsten, Product line manager at Coloplast, December 1 2006.

procurers in Denmark had shown interest in PVC-free medical devices.<sup>144</sup> My interview persons name two hospitals, Grenå and Holsterbro that were especially active in terms of demanding PVC-free products.<sup>145</sup> Therefore, Coloplast Denmark was looking forward to launching a urine bag made of non-PVC materials.<sup>146</sup>

The role of PVC-freeness in marketing situations was not only discussed at the group level, but also in Coloplast Denmark. All my interview persons point out that there were concerns about adverse reactions towards Coloplast's other products made of PVC. Kirsten, who prepared the promotion materials, recalls that this was tackled through a strategy of cautiousness towards mentioning PVC-freeness in the sales materials. Also Gerhard recalls that the word PVC-free was not used; instead the promotion materials stated that the bag material was more environmentally friendly than PVC.

Kirsten: "At that time we always used data sheets with a large picture of the products and there were a few of the main benefits on the front page and then a deeper description on the back side. And there I think we weren't even allowed to write that it was PVC free."<sup>147</sup> (translated from Danish by author)

Gerhard: "I don't think we used [the word] PVC-free, we used environmentally friendly".<sup>148</sup> (translated from Danish by author)

No launching materials from 1993 exist today.<sup>149</sup> When we look at an English promotion data sheet from 1994-95<sup>150</sup> and a later brochure, "Give the users a

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<sup>144</sup> Interview with Gerhard, marketing assistant at Coloplast June 21 2006, interview Kirsten, Product line manager at Coloplast, December 1 2006 interview with Mathilde, chief of product development at Coloplast November 7 2006 interview with Karin, sales consultant at Coloplast November 20 2007 and interview with Mikkel, chief of commercial development at Coloplast, April 27 2006.

<sup>145</sup> Interview with Gerhard, marketing assistant at Coloplast June 21 2006, interview Kirsten, Product line manager at Coloplast, December 1 2006 interview with Karin, sales consultant at Coloplast November 20 2007, interview with Mikkel, chief of commercial development at Coloplast, April 27 2006 and interview with Mathilde, chief of product development at Coloplast November 7 2006.

<sup>146</sup> Interview with Gerhard, marketing assistant at Coloplast June 21 2006.

<sup>147</sup> Interview with Kirsten, Product line manager at Coloplast, December 1 2006.

<sup>148</sup> Interview with Gerhard, marketing assistant at Coloplast June 21 2006.

<sup>149</sup> In my interviews, I got somewhat contradictory information about whether the marketing was started with a promotion data sheet on Conveen Security+ urine bag only or a brochure, "Give user a possibility to choose herself!", where both the urisheath and urine bag were advertised.

possibility to choose!” (“Giv brugerne mulighed for selv at vælge!” 1998) on drainage bags and urisheaths, both Kirsten and Gerhard respectively think they can recall that the formulation used in these materials, ”made from Polyethene (PE), a more environmentally friendly material than PVC used in traditional urine bags”, was also used in Denmark upon launching.<sup>151</sup>

In sales situations, PVC-freeness was used as a sales argument upon launch. Here, my interview persons provide slightly differing information about whether environmental friendliness was one of the main arguments and who it was used in relation to: procurers, professional users or end-users. However, both Gerhard and Karin<sup>152</sup>, who were closest to the clients, tell me that environmental friendliness and PVC-freeness were used actively as a main marketing argument in addition to the soft back-side and the kink-free inlet tube.<sup>153</sup>

Karin:”PVC free was a positive term. If you said that then they [nurses] nodded their heads and thought it sounded good.”<sup>154</sup> (translated from Danish by author)

PVC-freeness presented an opportunity as well as a threat. Marketers thus found themselves in a multivalent calculative space, where different calculative reasonings rubbed against each other (cf. Law and Akrich 1996: 211). In Denmark, then, environmental friendliness enacted as PVC-freeness was partly stabilized, partly delegated to aside. A distinction between environmentally friendlier and harmful products was made between PVC-free and PVC products in face-to-face contacts with customers. Yet, in marketing materials this distinction remained on a more subtle level: PVC-freeness was not mentioned in marketing devices although a linkage between PVC and environmental hazards was made. In the marketing materials, the product was thus reframed to include the anticipated overflows in

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<sup>150</sup> It is difficult to estimate the exact publishing time, but this seems like a probable time. Conveen security+ was published in UK in 1994-95. The next data sheet with two more sizes was published in UK in 1997.

<sup>151</sup> Interview with Gerhard, marketing assistant at Coloplast June 21 2006 and interview with Kirsten, Product line manager at Coloplast, December 1 2006.

<sup>152</sup> Interview with Karin, sales consultant at Coloplast November 20 2007, interview with Gerhard, marketing assistant at Coloplast June 21 2006 and E-mail correspondence with Gerhard Coloplast 27 June 2007.

<sup>153</sup> A DEPA report, however, reporting on Coloplast’s PVC-free urine bag project, states that the bag had not been marketed in any special way (Jørgensen and Høier 1995: 45).

<sup>154</sup> Interview with Karin, sales consultant at Coloplast November 20 2007

relation to other products made of PVC. Yet another trace of the partial delegation of the PVC-problematic can be seen in the way the representatives from the Coloplast group level participated in the Danish branch organization for medical devices. Coloplast's role in the branch organization was less focused on creating markets for PVC-free products than on not destroying markets for PVC products.

The reasons for the simultaneous stabilization and toning down of PVC-freeness in marketing materials and practices were manifold. On the other hand, the group level sent a strong signal to be cautious in relation to marketing on PVC-freeness. Also staff at Coloplast Denmark was concerned about not spreading any expectations that their PVC products could not fulfil. Both the group level and Coloplast Denmark were careful not to emphasize PVC-freeness as a product quality as it might have consequences on the largest selling product group, colostomy bags. On the other hand, sales consultants at Coloplast Denmark knew that there had been a strong interest for PVC-freeness in some Danish hospitals and counties and the issue had been discussed more widely in the public arena even though no restrictions on PVC-use had been issued. As the first and only provider of PVC-free urine bags Coloplast had an opportunity to attempt to establish itself as an obligatory passage point (Callon 1986: 202-03) for those who wished to pursue health care without harm. This served as an argument for using PVC-freeness as one of the main sales arguments.

Gerhard and Karin tell me that Coloplast Denmark was prepared for the possible tension between the new PVC-free product and the PVC products. Sales consultants were trained to tell why Coloplast also produced products made of PVC.<sup>155</sup> Coloplast Denmark, however, soon noticed that selling both types of products was not an issue on the market. The response from the customers did not indicate that PVC-freeness in urine bags would destabilize the competitiveness of other Coloplast products.

Gerhard: "It [that Coloplast also had PVC products] never became a big problem. The weird questions that we had imagined about colostomy bags and other products never came. It never became the big question."<sup>156</sup> (translated from Danish by author)

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<sup>155</sup> Interview with Karin, sales consultant at Coloplast November 20 2007 and e-mail correspondence with Gerhard, marketing assistant at Coloplast 27 June 2007.

<sup>156</sup> Interview with Gerhard, marketing assistant at Coloplast June 21 2006.

According to Karin, many of the nurses that sales consultants visited, only worked with urine bags, and the colostomy bag was therefore not an issue.<sup>157</sup> Those interested in Coloplast's strategy on products that were not PVC-free were told that Coloplast aimed at developing PVC-free products. This however, would not be possible in all product areas without comprising other important product qualities.

Karin: "And then some of them were so much into the debate that they became so knowledgeable about our products that they started to ask, if it was all of your products that are PVC-free from now on. And there you could say, yes everything they develop from now on is PVC-free, if possible. But is not all of our products we can develop in PVC free materials."<sup>158</sup> (translated from Danish by author)

According to Gerhard and Karin, many municipalities and professionals were positive towards the environmental friendliness. In practice, however, procurers were not willing to pay extra for PVC-freeness.<sup>159</sup><sup>160</sup> Conveen Security+ was and is sold in the high price segment of drainage bags.

Mikkel: "The attitudes of the procurers were that it is excellent, but we don't pay extra for it."<sup>161</sup> (translated from Danish by author)

Karin: "Then we got a PVC free bag launched as they had screamed for, but they didn't want to pay for it."<sup>162</sup> (translated from Danish by author)

According to Karin, this led the sales consultants to play more on other product features. They also explained their clients that one could use the bag for longer time which made a difference in relation to its price per user time. The latter was

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<sup>157</sup> Interview with Karin, sales consultant at Coloplast November 20 2007.

<sup>158</sup> Interview with Karin, sales consultant at Coloplast November 20 2007

<sup>159</sup> Interview with Kirsten, Product line manager at Coloplast, December 1 2006 and interview with Mikkel, chief of commercial development at Coloplast, April 27 2006 interview with Gerhard, marketing assistant at Coloplast June 21 2006 and interview with Karin, sales consultant at Coloplast November 20 2007.

<sup>160</sup> This general customer reaction to environmentally friendlier but more expensive urine bags is also confirmed by Palle, a sales consultant from one of the trading companies for medical devices in Denmark (Interview with Palle November 27 2006).

<sup>161</sup> Interview with Mikkel, chief of commercial development at Coloplast, April 27 2006.

<sup>162</sup> Interview with Karin, sales consultant at Coloplast November 20 2007

an attempt to reframe the calculative space for product qualification originally focused on price per product to focus on the total costs related to use of the bag instead. The reluctance to pay extra for PVC-freeness, then, influenced the way PVC-freeness was used in marketing. PVC-freeness was not elevated further as a sales argument even though it had become clear that PVC-freeness would not pose a danger to Coloplast's products made of PVC. Furthermore, I argue, the perceived success with functional arguments, such as the kink-free tube, an innovation that originally followed from the use of PVC-free material, and the soft back side referred to another source of successful singularization of the product. An extensive campaign on environmental friendliness would have delegated these other product features to the periphery. Thereby, environmental friendliness as a product quality remained stabilized, albeit *delegated below* other functionality related product qualities.

Across the years, Conveen Security+ has become a "ripe" product, as expressed by Joakim. In Denmark its growth has been stable although the exponential growth anticipated in the beginning of the product development phase has not been achieved.<sup>163</sup> It is well known on the market, and even though it is regularly presented to users, there has not been any specific campaigns promoting the bag since 1998. Environmental friendliness, amongst other product features, has therefore not been elevated specifically by new marketing efforts or materials. An illustrative example of this is that the existing marketing materials have very much kept their shape: the form of and the information given in a two-page promotion data sheet has hardly changed. Also information on the new media, the internet, more or less follows the old form. The bag has been on the market for several years and its marketing has been based on the same features as before, including environmental friendliness.

Even though the marketing of Conveen Security+ has followed more or less the same path for the past many years something has changed. Environmental friendliness has become one of the main sales benefits in the marketing materials. In 1998, a brochure, "Give the users a possibility to choose!" was (re)published in Denmark in relation to a sales campaign on Conveen Security+ urisheaths and urine bags. In this brochure PE was characterized as environmentally friendlier

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<sup>163</sup> Interview with Gerhard, marketing assistant at Coloplast June 21 2006.

than PVC, as cited before and was not mentioned in the very beginning of the text. Today, the first marketing claim on the front side of the promotion data sheet is:<sup>164</sup>

”Unique design made of environmentally friendly materials.”

On the back side of the sheet it says:

”Both the bag and the tube are made of Polyethylen (PE) that is environmentally friendlier than PVC that urine bags traditionally are made of.”

On the home page of Coloplast Denmark, in the introduction to the Conveen Security+ bag, as the first product feature, it says:

”Security+ urine bag – unique design with environmentally friendly material

Security+ urine bags are made of Polyethylen, a soft and light material that is environmentally friendlier than PVC that traditional urine bags are made of.”

In face to face contacts, environmental friendliness is also one of the sales arguments. Other claims are the kink-free tube, the adjustable length of the tube, the design and that the bag appears smaller than its size. Coloplast sales consultants do not present the bag by itself; it is always talked about in relation to either urisheaths or catheters, Gerhard and Marlene, product line managers, tell me.<sup>165</sup>

In the early 21<sup>st</sup> century, Unomedical, another Danish producer of urine bags, launched a PVC-free bed bag in Denmark. This bag was, however, withdrawn from the market as the customers did not perceive it as noiseless enough.<sup>166</sup>

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<sup>164</sup> Today, consultants in Coloplast Denmark use the promotion data sheet as part of a product binder for health care professionals. These binders are left with interested nurses in hospitals and other institutions. When relevant, Coloplast’s sales consultants attach new data sheet to this binder during their rounds to the customers in the treating organizations.

<sup>165</sup> Interview with Gerhard, marketing assistant and Marlene, product line manager at Coloplast June 21 2006.

<sup>166</sup> E-mail correspondence with Unomedical 10 and 11 September 2007. This seems to have been the only PVC-free bag launched in Denmark by other producers since the launch of Conveen Security+.



Moveen, Coloplast's other PVC-free urine bag series, was launched in Danmark in 2003. For Moveen, PVC-freeness was one of the – though not the main – sales arguments, Gerhard tells me.<sup>167</sup> On the back side of the Moveen promotion data sheet from 2006, after functional presentation, the device is characterized as being made of "PVC-free environmentally friendly material".

Both Gerhard and Marlene feel that the amount of questions related to PVC has decreased. However, they do not think that the interest for the PVC related problems has declined. Marlene assumes that the available information about the materials in the products and about PVC in general has made it possible for customers to get answers to their questions without referring to the sales consultants.<sup>168</sup>

Today, procurers pose questions about PVC in their calls for tenders. Tendering processes, indeed, present the most remarkable change in market relations. In these processes, it is the public procurers who define what product qualities they request information on in their call for tenders. According to Marlene and Gerhard, procurers are interested in PVC and phthalates. According to Marlene, however, questions about phthalates are not very specific. Rather than asking about particular phthalates, the procurers ask whether phthalates are used in the product. Phthalates are not mentioned in the marketing materials on drainage bags.<sup>169</sup>

I got a chance to look at the call for tenders that Coloplast has received either from counties or from municipalities through trading companies who are in charge of the municipal procurement processes since 2003. Many counties and municipalities pose questions about PVC and phthalates. Often information is requested on a specific Sinerfa data sheet that also includes information on many other environmental issues besides PVC and phthalates.<sup>170</sup> Palle, a sales consultant working for one of the Danish trading companies for medical devices,

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<sup>167</sup> E-mail correspondence with Gerhard, marketing assistant at Coloplast November 13 2007.

<sup>168</sup> Interview with Gerhard, marketing assistant and Marlene, product line manager at Coloplast June 21 2006.

<sup>169</sup> Interview with Gerhard, marketing assistant at Coloplast June 21 2006 and interview with Marlene, product line manager at Coloplast June 21 2006.

<sup>170</sup> As mentioned before, the Sinerfa data sheet is a generic data sheet that is used for all medical devices and thus includes a wide range of environment related questions.

also tells me, that those counties and municipalities that ask for environmental information, typically use the SINERFA data sheet.<sup>171</sup>

Since the launch of Conveen Security+, then, two issues have changed. Firstly, environmental friendliness has acquired a more visible position in the marketing materials. However, no extensive elevation of this product quality – or other product qualities for that matter – has been carried out in recent years. In the Conveen Security+ marketing materials, PVC-freeness is still not articulated as a product quality while the link between environmental friendliness and non-PVC-free materials is made. PVC-freeness, however, is mentioned in the Moveen marketing materials. Secondly, PVC and phthalates have become part of the procurement procedures in many more procuring units – and in quite a particular way. Their information requests enact PVC and phthalates amongst other issues as topics of environmental concerns. It seems however, that at least my interview persons have a very strong view of precisely PVC and phthalates being issues in the field of urine bags. Information about environmental qualities now circulates in written forms either in devices produced by the procuring entity or SINERFA.

## 5.7. Conclusive summary

The environmental friendliness of Conveen Security+ urine bags is strongly anchored to the PVC-free materials used in the bag. This linkage is produced both in and outside of Coloplast. Indeed, the very distinction between environmentally friendly and harmful established between PVC and PVC-freeness seems to have been translated into the product development practices in Coloplast from politics, science, public discussion and public procurement. Environmental friendliness as a product quality of Conveen Security+ is originally mainly stabilized based on one particular issue: it is perceived as having a positive impact on the competitiveness of the product due to anticipated regulatory restrictions and growing user concern for the environment. Adding a quality of PVC-freeness to the product could thus be seen as an attempt to participate in the quest for re-qualification of urine bags in the market (cf. Callon et al. 2002: 204).

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<sup>171</sup> Interview with Palle November 27 2006

Environmental friendliness is not the only product quality that is required of the product before it is rendered in the hands of buyers and users. PVC-freeness is not always compatible with other product materials, components or other product criteria as they take form or emerge in the course of product development. Despite the seeming stability of environmental friendliness, the product development process comprises of several events where PVC-freeness, and therefore also environmental friendliness, has to be coordinated (Mol 2002) with other product qualities. Sometimes PVC-freeness is privileged over other product qualities but even more often the conflict between it and other product qualities is made avoidable. In these trials of strength, the coordination between environmental friendliness and other product qualities is avoided by either making compromises and adjustments in other product dimensions, separation of the incompatible product features from each other or by postponing the coordination. It is intriguing to observe how juggling with other dimensions of the product, like the shape and the diameter of the PVC-free tube, enables the preservation of environmental friendliness. Thanks to this flexibility of the product in the making, environmental friendliness hardly appears to be in conflict with another product quality. Furthermore, the challenges posed by the PVC-free material to the design of the bag lead to innovations. The corrugated tube, for example, emerges as a solution to the kink problem with the PVC-free material.

In product development, PVC-freeness is stabilized and acquires material form. However, upon launch, PVC-freeness becomes partly destabilized as a product quality. In test marketing, the top management decision that PVC-freeness is to be toned down brings about a drastic reframing of the product. However, when the product is launched, the articulation of PVC-freeness as a product quality is allowed to be part of the marketing talk in countries where the topic is discussed. In Denmark it is used extensively in face-to-face contacts. In marketing materials it is given a more subtle form: the bag is announced to be made of materials that are more environmentally friendly than PVC. Rather than stabilizing PVC-freeness as a product quality in the marketing materials, marketing professionals in the Danish subsidiary to Coloplast attempt to make a more generic notion of environmental friendliness part of singularization of Conveen Security+. Thus, PVC-freeness is partly stabilized as a product quality, partly delegated to the side in order not to cause overflows in the framing of other products made of PVC as the firm balances between caution and opportunity.

The reason for the partial destabilization of PVC-freeness stems from competitiveness calculations made for quite another product group, the colostomy bags. As it has not been possible to develop a PVDC-free colostomy bag by the time the PVC-free urine bag was launched, it is anticipated that raising the PVC issue could change the perception of Coloplast's colostomy bags. As the PVDC-free colostomy bag has difficulties containing the odors of its content, PVC-freeness is reframed from a quality that enhances competitiveness to something that potentially reduces it. Therefore, marketing professionals in Coloplast seek to launch a framing of Conveen Security+ that simultaneously allows for environmental friendliness and prevents overflows related to PVC in other products from becoming visible.

As we have seen in this chapter, the extent to which environmental friendliness or PVC-freeness stabilizes as a product quality in product development and marketing is a complex process. Qualities like environmental friendliness emerge as co-produced and as an outcome of distributed agency rather than a work of one person alone (cf. Akrich et al. 2002a: 191). In the product development, not only product developers, but also marketing professionals, production engineers, and users are enrolled in shaping the emerging product. Upon product launch, the interaction between the producer, the product and the buyer intensifies. Coloplast's launching strategy is an attempt to set the stage, to define the qualities of the product in a way that makes it possible to attach the bag to a customer. However, at this point in time, the role of the demand side actors acquires further strength in participating in the singularization and qualification of the product. As a result of this reciprocal work of qualification and reframing of the product, environmental friendliness is delegated aside while functional qualities and price acquire more impetus in the producer's articulation of the product benefits. Over the years, we see a slight movement in relation to the stability and relative weight of environmental friendliness as a product quality emerging from both Coloplast and the buyer side. Coloplast Denmark has kept environmental friendliness as one of its marketing claims and it is even elevated to be one of the main claims in marketing materials. Furthermore, environmental aspects of products are also stabilized in tendering documents issued by public procurement offices. These information requests enact environmental friendliness in relation to PVC and phthalates – but also a number of other issues.

Today, environmental friendliness is – to a certain extent – stabilized in the relation between Coloplast and professional procurers. This, however, does not yet tell how stable environmental friendliness is when products are chosen. In the following chapter, I will investigate the buyer and user side of the market. Here I will look into what role environmental friendliness acquires at places where drainage bags are procured and where the qualification of the product leads to an attachment of the bag to its user.



## 6. ENVIRONMENTAL FRIENDLINESS IN PROCUREMENT AND USE OF DRAINAGE BAGS

When I first got acquainted with the use and users of urine bags, it quickly became clear to me that the work of qualifying these devices was a complicated matter. In hospitals and clinics where the use is of a more temporary nature the nurses choose which bags are used for a particular patient. If the bag is to be used permanently the very same nurses also recommend the most suitable urine bag to the patient's municipality of residence. The recommendation to start using a particular urine bag or to change a previously recommended urine bag can also be initiated by municipal nurses or doctors. The bags that are recommended by the municipal nurses also have to be accepted for financing in the municipality. In the organizations that I visited, urine bags are purchased through procurement agreements between the procuring organization and one or several suppliers. Given the complexity of the landscape, it is possible that the qualification of the bag is both dependent on the county and the municipality procurement agreements as well as individual needs assessments in the county hospital and the municipal home organization. In all these different settings environmental friendliness might very well obtain a different role and stability, yet this role might be affected by previous or upcoming events where qualifying work is also performed. This chapter deals with the work carried out on the user side in order to make the market exchange of urine bags possible. Specifically, the focus is on the role of environmental friendliness in this process.

This chapter consists of three subchapters on 1) the public procurement processes at the county and municipality level, 2) needs appraisals in health care institutions in both county and municipal settings and 3) end-user participation in the process

of choosing and procuring urine bags. The aim of these parts is to investigate the role of environmental friendliness in different possibly interrelated practices in procurement and use of drainage bags. All the subchapters follow a more or less unified sequence of analysis: I will start by discussing the form and way in which environmental friendliness is enacted in the setting when relevant. I then proceed by describing the comparison of product qualities and the process of choosing products. Finally, I will discuss which issues might have contributed to the possible destabilization of environmental friendliness in the coordination of product qualities.

## 6.1. Environmental friendliness in public procurement agreement processes

In this subchapter we take a look at procurement agreement processes in the municipality of Solbæk, and in the counties of Arnæs and Fredenshus.<sup>172</sup> Currently, the counties of Arnæs and Fredenshus and the municipality of Solbæk each organize their urine bag procurement processes as EU public procurement agreement processes which entails that they have to follow a number of procedural rules. Therefore, call for tenders in both counties and the municipality of Solbæk include award criteria and product specifications. Award criteria indicate which product or service dimensions are significant when choosing between tenders. Product specifications give technical specifications of the products needed. Awarding the contract to a particular tender has to legally follow from the criteria and preferences specified in the call for tenders. The role of qualities defined in product specifications is non-negotiable according to the law. If, for instance, PVC-freeness is defined as a product quality in the product specification, the organization has to buy PVC-free products. Tenders are evaluated either according

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<sup>172</sup>The starting point of this chapter is the latest tendering processes in the municipality of Solbæk and the counties of Arnæs and Fredenshus in the years 2003 and 2004 where public procurement agreements were established between the county procurement unit or the municipal health care sector procurement unit and one or several suppliers. The changes in procurement practices through the 1990s in these two counties will also be discussed. Unfortunately, I was not able to interview the person responsible for urine bag procurement in the municipality of Solbæk in the 1990s. I was also not able to retrieve any other kind of data from that era apart from the previous call for tenders.



to the principles of the cheapest tender or the overall economic performance of the tender.<sup>173</sup>

In Arnæs, Fredenshus and Solbæk, environmental friendliness is part of the supplier information requests and information disseminated to the user group. In Solbæk and Arnæs, environmental friendliness is part of the award criteria. In the county of Fredenshus, environmental friendliness has been considered under an award criterion called quality. However, as Jonna and Anders who have been responsible for urine bag procurement tell me, it has never been an explicit award criterion in the procurement of urine bags.<sup>174</sup>

Environmental friendliness has not always been enacted as a product quality in all three organizations although the process of organizing procurement processes has more or less had the same basic form. In the municipality of Solbæk, environment was not included as an award criterion in the information requests in the previous agreement process for urine bags in 2002 (i.e. call for tenders issued by the procuring party 2002).<sup>175</sup> According to Peter, a procurement officer in the county of Arnæs, environmental friendliness has been one of the award criteria in the county of Arnæs already for some procurement agreement periods.<sup>176</sup> Both counties have requested environment related information for several years, starting from the mid 1980s and early 1990s.

Concerning the situation today, my interview persons tell me that when it comes to the environmental impact of urine bags, PVC is the focus of discussion. In the county of Arnæs, the environment award criterion is defined as PVC-freeness. Furthermore, both counties include a paragraph in the call for tenders that states that the county welcomes PVC-free products to the extent possible. In addition, the county of Arnæs agreed on its first environmental policy in the mid 1990s and since then it has been customary to refer to the environmental policy of the county at a generic level.

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<sup>173</sup> For more on EU public procurement regulations see European Parliament/Council 2004.

<sup>174</sup> Interview with Anders, procurement officer in the County of Fredenshus May 29 2007 and interview with Jonna, procurement officer in the County of Fredenshus October 4 2006/May 29 2007.

<sup>175</sup> Helle, procurement officer in the municipality of Solbæk, decided to include environment in the award criteria after having consulted with the user group as the environment is both included in the procurement policy of the municipality (the procurement policy of the municipality 2003 and the strategy for procurement in the municipality 2004) and already appears in tender documents for other product groups.

<sup>176</sup> Interview with Peter, procurement officer in the County of Arnæs July 23 2007.

Information about the PVC-content of the product is also requested from the suppliers. However, these information requests do not define PVC as the only topic of importance in relation to the environment. Peter, Jonna and Helle, procurement officer in the municipality of Solbæk, request more detailed environment related information on a Sinerfa data sheet (Appendix IV). Both Helle and Peter have been involved in developing this data sheet.<sup>177</sup> The form features questions on materials used in the product, whether PVC is used and to what extent, what plasticizers are used if PVC and the percentage of them in PVC. Furthermore, questions on heavy metals, chlorine and other unwanted substances, recycled materials, packaging materials, eco-labels and environmental certifications of the production systems, durability and right storage and disposal are posed. As mentioned before, the Sinerfa data sheet is a generic data sheet used for all types of medical devices. Peter tells me that the data sheet was developed in cooperation with the medical devices industry in order to streamline the different types of information requests and answers that both procurers and producers were exposed to.<sup>178</sup>

In addition to the Sinerfa data sheet, Jonna and Helle ask the suppliers to fill in a generic product data sheet including some environment related information on product materials and packaging. Jonna also asks whether there is PVC or phthalates (and which) in the product. Furthermore, both Helle and Jonna encourage the tendering parties to submit further information on their environmental performance. Helle does this by including a generic paragraph often used in different tender documents on the municipality's approach to the environment and Jonna by talking to the tenderers.<sup>179</sup>

After the tenders have arrived from the suppliers, the procurement officers compile product related information for the user group members. The information is sent to the user group in order for them to compare and choose the products needed for the following agreement period. Thereby, yet another device through which environmental friendliness is enacted is taken into use. Information relating to the

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<sup>177</sup> Interview with Peter, procurement officer in the County of Arnæs July 23 2007, interview with Jonna, procurement officer in the County of Fredenshus October 4 2006/May 29 2007 and interview with Helle, procurement officer in the Municipality of Solbæk September 28 2006/April 16 2007.

<sup>178</sup> Interview with Peter, procurement officer in the County of Arnæs July 23 2007.

<sup>179</sup> Interview with Helle, procurement officer in the Municipality of Solbæk September 28 2006/April 16 2007 and interview with Helle, procurement officer in the Municipality of Solbæk September 28 2006/April 16 2007.

product materials and substances collected with the help of the SINERFA data sheet is included in the spread sheet that Jonna sends to the user group. Peter sends his user group a data sheet where the possible PVC-freeness or PVC materials are mentioned as the only environment related information.<sup>180</sup> Helle includes all the environment related information in the user group materials.<sup>181</sup>

However, not all of the information provided by the data sheets is in active use in relation to choosing urine bags in the municipality of Solbæk and in the county of Fredenshus. As in the county of Arnæs, PVC is the dimension that is perceived as most significant for awarding urine bags.

Jonna: "What we discuss if we discuss environment is PVC."<sup>182</sup>  
(translated from Danish by author)

In the county of Fredenshus, none of the other environment related product qualities play a role in the latest procurement process: Jonna solely checks if any of the tenders has got PVC-free products.<sup>183</sup> Besides PVC, Helle controls that none of the chosen bags include phthalates that are considered dangerous in public risk assessments.<sup>184, 185</sup>

Information on potential PVC-freeness of the products is included in the information Peter gives to procurers in the hospitals.<sup>186, 187</sup> Neither Jonna nor Helle

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<sup>180</sup> Interview with Peter, procurement officer in the County of Arnæs July 23 2007.

<sup>181</sup> Interview with Helle, procurement officer in the Municipality of Solbæk September 28 2006/April 16 2007.

<sup>182</sup> Interview with Jonna, procurement officer in the County of Fredenshus October 4 2006/May 29 2007.

<sup>183</sup> Interview with Jonna, procurement officer in the County of Fredenshus October 4 2006/May 29 2007.

<sup>184</sup> Interview with Helle, procurement officer in the Municipality of Solbæk September 28 2006/April 16 2007.

<sup>185</sup> At the time of making the procurement agreement, the EU was still carrying out risk assessments on the most used phthalates, but the final results were not yet available. Therefore, Helle only took phthalates that were suspected to have reprotoxic effects into consideration.

<sup>186</sup> Interview with Peter, procurement officer in the County of Arnæs July 23 2007.

<sup>187</sup> Since 2000, the county of Arnæs has had a procurement system that covers all the county hospitals. Before this, all the hospitals had their own electronic systems. In the shared system information on the products is included in the procurement agreement: name, product number and technical details like size, tube length and so forth. In the description text for urine bags, Peter has noted if the bag is PVC-free. Before 2000, Peter included information on PVC into the part of the hospital procurement system that he was responsible for (Interview with Peter, procurement officer in the County of Arnæs July 23 2007).

has ever enclosed environmental information on the products in their product databases that are used by those who order products.<sup>188</sup>

The information requests together with the awarding criteria present a rather uniform enactment of environmental friendliness across the three organizations. Furthermore, even though all procurers request information on many different versions of environmental friendliness, in the actual product comparison their focus is on PVC – and, in Helle’s case, also phthalates. The multiplicity of environmental friendliness is thus simplified by privileging one of the versions, PVC-freeness, and disregarding others (Mol 2002: 62).

Enacting environmental friendliness as related to PVC has not, however, always been the case in these three organizations. In the counties of Fredenshus and Arnæs, an environmental data sheet had already been in use in the early 1990s – albeit in a different form from that of the SINERFA data sheet today. In the county of Fredenshus, through the 1990s, the environmental focus of the data sheet had been on the environmental performance of the producer. However, also some questions regarding PVC, latex and heavy metals had been added when these issues became topics of public discussion. PVC, Jonna tells me, was included due to the focus on adverse effects of incineration at the time. Phthalates were introduced to the information request form around the year 2000.<sup>189</sup> The data sheet had become simplified at some point after 1998 where it was still used. Both of my interview persons in the county of Fredenshus emphasize, that the data sheet was continuously developed in different procurement processes for different products.<sup>190</sup> With the introduction of the SINERFA data sheet, also questions regarding the environmental performance of the producers were reduced to one question on environmental management systems.

In the county of Arnæs, requesting environmental information started from a particular environmental problem, PVC, already in the 1980s. At that point the environmental impacts of PVC observed and communicated by scientists, amongst others, caused public turbulence. As a reaction to the public discussion, the

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<sup>188</sup> Interview with Helle, procurement officer in the Municipality of Solbæk September 28 2006/April 16 2007 and interview with Jonna, procurement officer in the County of Fredenshus October 4 2006/May 29 2007.

<sup>189</sup> Interview with Jonna, procurement officer in the County of Fredenshus October 4 2006/May 29 2007.

<sup>190</sup> Interview with Anders, procurement officer in the County of Fredenshus May 29 2007 and interview with Jonna, procurement officer in the County of Fredenshus October 4 2006/May 29 2007.

procurement officer in the county of Arnæs started to inquire whether the products that were offered were made of PVC or non-PVC materials.

Peter: "Right from the start it [the information request] was very focused on PVC. It was it [PVC] that drove the discussion."<sup>191</sup>

### **Simplifying environmental friendliness**

As we have seen, environmental friendliness is or has become simplified and is enacted mainly as PVC-freeness. This simplification is carried out as PVC-freeness is privileged over production related environmental qualities and other product related environmental qualities in order to make comparison possible. Both Peter and Jonna note that all the production related environmental qualities, such as waste water emissions from the production plant, are deliberately ruled out as they complicate the comparison.<sup>192</sup> Including them would thus make comparison very complex and go beyond the knowledge of the procurer.

Jonna: "Many times you could not let one thing stand alone because it could be that in that particular process the production unit was amazingly clean and had an unbelievable fine environmental certification. But, on the contrary, the product you bought was very bad for the environment... It was just truly useless and I said this does not help us at all. We have to ask for things we can work with."<sup>193</sup>  
(translated from Danish by author)

Furthermore, Jonna and Helle both refer to EU-legislation<sup>194</sup> according to which production related environmental impacts cannot be taken into consideration when carrying out public procurement.<sup>195</sup>

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<sup>191</sup> Interview with Peter, procurement officer in the County of Arnæs July 23 2007.

<sup>192</sup> Interview with Peter, procurement officer in the County of Arnæs July 23 2007 and interview with Jonna, procurement officer in the County of Fredenshus October 4 2006/May 29 2007.

<sup>193</sup> Interview with Jonna, procurement officer in the County of Fredenshus October 4 2006/May 29 2007.

<sup>194</sup> For more on EU-legislation on inclusion of environmental concerns in public procurement see i.e. Commission interpretative communication of 4 July 2001 on the Community law applicable to public procurement and the possibilities for integrating environmental considerations into public procurement and Court of Justice (2002 and 2003).

<sup>195</sup> Interview with Jonna, procurement officer in the County of Fredenshus October 4 2006/May 29 2007 and interview with Helle, procurement officer in the Municipality of Solbæk September 28 2006/April 16 2007.

On the other hand, also other product related qualities are not included: it is only PVC and to a certain extent phthalates in the municipality of Solbæk that are taken into consideration. Some of the information, like information on heavy metals or latex, requested in the Sinerfa form is irrelevant for urine bags as these are not used in the bags. All my interview persons tell me that paying attention to phthalates was difficult in the most recent procurement agreement process, as there was an on-going scientific controversy as to which phthalates were harmful and how harmful they were. PVC as source of environmentally adverse effects, on the contrary, has acquired more durability. According to Peter and Helle, avoiding PVC has become a policy in the county and the municipality. Besides the municipality having an active stance on reducing the amount of PVC used, for Helle, concentrating on PVC in this respect is just something that happens because it is generally known to be the problem in plastic devices.<sup>196</sup>

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In this section, we have seen how environmental friendliness is enacted as a product quality across procurement agreement processes in three different organizations. The distinction between environmentally friendly and harmful product qualities is established through several devices as environmental information requests, product data sheets, spreadsheets compiling different tenders and product data bases. These devices enable classification: they give information that makes it possible to divide products into groups of those that are made of PVC or non-PVC materials, those that include phthalates or heavy metals or do not and so forth and thereby make the comparison of products possible (cf. Callon and Muniesa 2005: 1235-6, Callon et al. 2002: 196). These devices break environmental friendliness into one or several calculable qualities, parameters according to which it can be assessed whether environmental friendliness is achieved or not. In the form of these specific qualities, environmental friendliness becomes calculable. With the help of these devices it is possible to tell how many percentages of plastic is PVC, if there is an ISO certification or not, and what the emissions of the production plant are. As noted by Callon et al. (2002), the buyer side participates in objectification of product qualities, here environmental friendliness, and different tools equip them to do this (Callon et al. 2002: 202).

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<sup>196</sup> Interview with Peter, procurement officer in the County of Arnaes July 23 2007 and interview with Helle, procurement officer in the Municipality of Solbæk September 28 2006/April 16 2007.

However, despite the multiple forms in which environmental friendliness is enacted, one of the forms is more durable than others: PVC-freeness. PVC-freeness, and in Helle's case freeness from some particular phthalates, is privileged over other versions of environmental friendliness which establishes a distinction between environmentally friendly and harmful products according to the dichotomy of PVC – PVC-free. This privileging stems from the very source that makes environmental friendliness a comparable product quality: calculability. The measurable character of the different versions of environmental friendliness makes it possible to compare products within the same quality, within a single parameter of environmental friendliness. The very same calculability, however, makes it difficult for the procurement officers to establish a distinction between environmentally friendly and harmful products: if environmental friendliness is seen as a quality composed of several different parameters there should be a way of relating these environmental impacts to each other. This, in Mol's terms, would make the different information calibrated and thereby comparable (cf. Mol 2002: 75-82). This, however, is not the case in the procurement practice. Furthermore, some of the parameters, like those regarding phthalates, are topics of scientific controversy. In the absence of calibration tools and scientific information that is perceived as credible, environmental impacts remain incommensurable. As a consequence of this environmental friendliness is reduced to one parameter only, PVC-freeness. Calculations within this single parameter take a rather simple form: products are classified as either non-PVC or PVC products.

Neither the continuous enactment of environmental friendliness nor the classification that enables comparison between products in environmental terms tells us how stable this quality is in relation to other (classified) qualities in the municipal or county procurement agreements. Whether environmental friendliness enacted as PVC-freeness or as something else becomes stabilized in relation to other product qualities is the topic of the next part of this chapter. In the following, I will discuss how environmental friendliness is coordinated with other product qualities. Procurement requires a particular type of coordination, an activity that relates qualities to each other to make an order between them. This is necessary in order to be able to compare and choose between different products. The focus is, therefore, on the position environmental friendliness obtains when the preference order between qualities unfolds. Furthermore, reasons for the relative weight of environmental friendliness in the emerging preference orders are discussed.

### 6.1.1. Ordering qualities

Defining the dimensions according to which the products will be compared with each other already begins while preparing for the call for tenders. Product specifications and award criteria provide the first indication of what product qualities will be looked into when choosing amongst the competing products. Furthermore, they also indicate how different product qualities will be related to each other when the relations between different compilations of product features are assessed. After the tenders have arrived, it becomes possible to compare products, even in their physical form as samples and tenders as such. Calculative devices, i.e. data sheets, are built in order to facilitate this comparison and for the user group members to be able to choose the products they will qualify in the procurement contract. The tendering procedures, the tenders and the comparison practices together form a calculative space within which certain products are qualified or not qualified in the procurement agreement.

This calculative space takes a different form in all three organizations. Yet the preferences in comparison and qualifying particular product qualities carry some resemblance. In my interviews, two product qualities rise above others: functionality and price. Functionality, indeed, is specified in some detail already in the product specifications. Product specifications define the features that are to be fulfilled in the winning tender. Thus, they define the independent product qualities, qualities that qualify no matter what the other properties of the product might be. In all three organizations, the product specifications take outset from the previous year's figures of and trends in use of particular type of products. These figures are delivered by members of the user group or people responsible for daily procurement in the organizations. Products are specified by i.e. size, tube length, sterility, possible transparency of the bag, type of out-let mechanism, attaching mechanisms and so forth. The municipality of Solbæk even names exact products in the product specifications.<sup>197</sup> The names are included in the specifications to indicate the functionalities that are needed.

All my interview persons emphasize the priority of functionality which should not be compromised – at least not in relation to environmental friendliness.

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<sup>197</sup> However, it is also notified that similar products will also be able to qualify. This is necessary in order to live up to EU legislation. According to the EU, public procurement has to allow for competition between producers (European Parliament/Council 2004).



Jonna: "To put it nicely, the users do not give a damn about green public procurement. It is the optimal functionality of the product. If it also has a green profile, fine. It is functionality and value for money... So we go for "enough is enough" and "value for money". And after they are in place, it is quite all right if it's green, but..."<sup>198</sup> (translated from Danish by author)

Helle: "We could not say that we wanted to have PVC-free products, because then there would have been some people who would not get the urine bags [they were used to]." <sup>199</sup> (translated from Danish by author)

The importance of functional features of the bags is also underlined when tenders are received and products are compared with each other. This is illustrated by an example that both Peter and Jonna give me from a previous call for tenders.<sup>200</sup> In the early 21<sup>st</sup> century, when the urine bags were a subject of a tendering process, Jonna received a tender suggesting a particular PVC-free urine bag.<sup>201</sup> Jonna characterizes this bag as very noisy and functionally resembling a prototype that was not yet fully developed – which led to disqualifying the bag.<sup>202</sup> Peter encountered a similar problem many years ago, most likely in the early 1990s. According to Peter, noisiness was not crucial for bed bags, but when the bags were used as leg bags it was, however, not acceptable.<sup>203</sup> In the case of the noisy leg bags, functionality was thus privileged over environmental friendliness.

Jonna: "They [the PVC-free bags] were more expensive, worse in terms of quality and we assessed that there was no point in thinking about PVC-freeness in relation to urine bags."<sup>204</sup> (translated from Danish by author)

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<sup>198</sup> Interview with Jonna, procurement officer in the County of Fredenshus October 4 2006/May 29 2007.

<sup>199</sup> Interview with Helle, procurement officer in the Municipality of Solbæk September 28 2006/April 16 2007.

<sup>200</sup> Interview with Peter, procurement officer in the County of Arnæs July 23 2007 and interview with Jonna, procurement officer in the County of Fredenshus October 4 2006/May 29 2007.

<sup>201</sup> This PVC-free bag might have been produced by Unomedical, who launched a PVC-free bed bag with a crackling noise around this point in time. However, Jonna does not recall the producer of the bag.

<sup>202</sup> Interview with Jonna, procurement officer in the County of Fredenshus October 4 2006/May 29 2007.

<sup>203</sup> Interview with Peter, procurement officer in the County of Arnæs July 23 2007.

<sup>204</sup> Interview with Jonna, procurement officer in the County of Fredenshus October 4 2006/May 29 2007.

Peter: "We prefer of course the PVC-free [urine bags] but we also look at functionality. You have probably heard of that the bags made noise in the beginning. The patients were not happy about that. So it was because of functionality we ruled them out. We could not ask people to go around with them."<sup>205</sup> (translated from Danish by author)

Besides functionality, price is also significant. Price, like functionality, is rated higher than environmental friendliness in all organizations.

Satu: "Have you ever been in a situation where the PVC-free bag would have been either too expensive or not good enough functionally?"

Peter: "We have examples of that kind of situations. We cannot do anything about it, they get ruled out. We take another bag with PVC."<sup>206</sup> (translated from Danish by author)

Jonna: "Of course we want to have environmentally friendly products. We just cannot use 200 000 more on them."<sup>207</sup> (translated from Danish by author)

The relative significance of price – and functionality – over environmental friendliness is further emphasized by the fact that environmental friendliness is not included in the product specifications. This allows for always maintaining price as a more important factor than environmental friendliness.

Peter: "It is because of this that we write it [environment] in the award criteria [instead of in the product specifications], if we get tenders that are too expensive."<sup>208</sup> (translated from Danish by author)

Including environmental friendliness in the product specifications would reduce the number of products that could be chosen from as product specifications legally bind the organization to purchase only the type of products specified in the specifications. Furthermore, by not including environmental friendliness in the product specifications, a preference order is established where environmental

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<sup>205</sup> Interview with Peter, procurement officer in the County of Arnæs July 23 2007.

<sup>206</sup> Interview with Peter, procurement officer in the County of Arnæs July 23 2007.

<sup>207</sup> Interview with Jonna, procurement officer in the County of Fredenshus October 4 2006/May 29 2007.

<sup>208</sup> Interview with Peter, procurement officer in the County of Arnæs July 23 2007.

friendliness as a product quality is *dependent* on particular functionalities that are already defined in the tender documents and on the price.

After the tenders have arrived from the suppliers, we once more encounter a conditioning of environmental friendliness as a product quality. This time, however, the product samples define the available qualities for the respective procurement agreements in a more detailed level than could be done in product specifications. Making environmental friendliness dependent on functional- or price qualities thus happens in two phases: initial conditioning during the tendering procedures and conditioning when comparing products after the tenders have been received. As a result, *environmental friendliness is regarded on a condition of co-existence with other qualities*: taking environmental friendliness into account only happens if it is related to a product with a suitable price and functionality.

There are, however, exceptions to this preference order. Some of these will be discussed in the following. I argue that environmental friendliness can be both supported by concerns for other qualities and be privileged in different ways over other qualities.

### **Environement supported by other product qualities**

The way procurers address phthalates provides us with an interesting view on how the natural environment and health issues become intertwined in the way the procurers address PVC. All my interview persons know that phthalates are used in soft PVC and that there are direct health related concerns regarding these plasticizers. The way the health and environmental concerns influence each other in the procurement processes, take rather different forms in the three procurement offices.

Helle differentiates between PVC that is bad for the environment and users, and PVC that does not have direct health risks for its users as the plasticizers used in it are not shown to be harmful. She uses her knowledge on phthalates for controlling that none of the urine bags bought include phthalates that have been defined as harmful in scientific investigations. The health risks related to some phthalates and the environmental concerns related to PVC thereby become mutually supporting for each other and the harmfulness of specific types of PVC.

Peter sees phthalates as a part of the overall PVC-discussion. He has not gone deeply into defining which phthalates would not be accepted. Indeed, when I talk with Peter, PVC-freeness which equals no phthalates seems to have become a quality that is used to establish a distinction between products having adverse effect or not having direct adverse effects on the health of the user.

Satu: "Have you looked at some specific phthalates?"

Peter: "No, we have not been so specific about it. We have just said that we want them out."<sup>209</sup> (translated from Danish by author)

In both Helle's and Peter's case, framing PVC as harmful becomes strengthened by the health risks related to phthalates. PVC is not only harmful for the natural environment, it might also have direct adverse health effects to its users due to the plasticizers used in it. For Jonna, on the contrary, phthalates pose an – in terms of urine bags – rather insignificant health risk:

Jonna: "A PVC urine bag that hangs on the bed does not come into contact with the patient. And this is where it is different from those products that come in contact with the patient. If it is a catheter or something else that is set in the body, one thinks very very much about PVC and phthalates."<sup>210</sup> (translated from Danish by author)

For Jonna, environmental friendliness in terms of PVC-freeness is thus not supported by direct health risks in the urine bag product group.

These different roles played by health effects in supporting or not supporting environmental friendliness seem to be rooted, at least partly, in different classifications of end-users. Peter and Helle procure bags for both bed-ridden and moving clients, whereas Jonna defines her target group as bed-ridden patients at hospitals. Neither Helle nor Peter differentiates between bedridden and more mobile end-users in regard to the direct health risks involved in using particular plasticizers.<sup>211</sup>

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<sup>209</sup> Interview with Peter, procurement officer in the County of Arnæs July 23 2007.

<sup>210</sup> Interview with Jonna, procurement officer in the County of Fredenshus October 4 2006/May 29 2007.

<sup>211</sup> Interview with Peter, procurement officer in the County of Arnæs July 23 2007, interview with Jonna, procurement officer in the County of Fredenshus October 4 2006/May 29 2007, interview with Helle, procurement officer in the Municipality of Solbæk September 28 2006/April 16 2007 and interview with Helle, procurement officer in the Municipality of Solbæk September 28 2006/April 16 2007.

Another example of environmental friendliness being supported by other qualities comes from the way product specifications are constructed in the municipality of Solbæk. As explained above, the product specifications given in the tendering documents mention specific product names. All the named bags are included in the product specifications because the user group wants to secure that bags with a similar functionality as what had been used before would be available also in the upcoming agreement period. This leads to a situation where all the tenderers bid in the same products as suggested in the product specifications. The specific names included in the product specifications function as a powerful inscription device for the suppliers. Two of the requested bags are from a brand Conveen Security+ which is PVC-free. This is also noticed by Helle, who checks all the tenders for PVC-free products.<sup>212</sup> Naming particular products in the product specifications because of their functional qualities has thus created a situation where choosing a PVC-free product is strongly supported by the calculative space.

### **Privileging environmental friendliness with a price condition**

The case of Arnæs presents us with some exceptions to the predominant role of price in regard to environmental friendliness. When Peter compares products, he notices that the price difference between PVC and available PVC-free products is not great. The user group assesses that the functionality of the PVC-free products is appropriate and the price to be paid for PVC-freeness is not so high that they would consider it a disqualifying amount.

Satu: "How much extra do you pay [for the PVC free urine bags]?"

Peter: "It is not very much. It is so little that we do not think about it."<sup>213</sup> (translated from Danish by author)

In Arnæs, the user group allows for buying PVC-free products although they are slightly more expensive than PVC products. Therefore, PVC-freeness becomes *conditionally privileged over price up to a certain price level*.<sup>214</sup> This, however,

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<sup>212</sup> Interview with Helle, procurement officer in the Municipality of Solbæk September 28 2006/April 16 2007.

<sup>213</sup> Interview with Peter, procurement officer in the County of Arnæs July 23 2007.

<sup>214</sup> In the scope of this project, it has not been possible to investigate closer how the appropriate price level was negotiated. An interesting case of this, albeit in the field of medicine, is provided by Sjögren and Helgesson (2007) on determining a reasonable cost of pharmaceutical treatment (Sjögren and Helgesson 2007: 229-231).

only happens in regard to those product types where an environmentally friendlier alternative is available.

### **Privileging environmental friendliness within a subcategory**

The county of Arnæs offers yet another interesting deviation from the dominance of price as one of the main qualifying product criteria. If the product has been functionally viable, Peter has often bought some bags despite the eventually higher price. This has been done in order to support the product development and with an ambition of increasing production levels and thereby influencing the price development favourably.<sup>215</sup>

Satu: "So sometimes you have paid more [for the PVC-free urine bags than the PVC bags]?"

Peter: "We certainly have. In the name of product development we have paid more. But it has been quite restricted what we have been able to pay because we have not gotten more money for it in the budget."<sup>216</sup>  
(translated from Danish by author)

Not all the hospitals in the county, however, have been willing to purchase more expensive products from their budgets just because they have been PVC-free. In the 1980s, it was only some of the hospitals in the county that were interested in going PVC-free. In particular, a procurement officer in one of the hospitals was very committed to out phasing PVC. Therefore Peter and the person responsible for daily procurement and storage related issues in the hospital decided that they would launch the PVC-free bags in this hospital. Gradually more hospitals joined, but in the beginning there was no consensus about the issue in the user group.

Peter: "In the beginning there were some hard core environment freaks that tried to press the other ones [in the user group] and the others that could not have cared less. We had an alliance with some of the hospitals and so we began to get those [PVC-free products]."<sup>217</sup>  
(translated from Danish by author)

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<sup>215</sup> Interview with Peter, procurement officer in the County of Arnæs July 23 2007.

<sup>216</sup> Interview with Peter, procurement officer in the County of Arnæs July 23 2007.

<sup>217</sup> Interview with Peter, procurement officer in the County of Arnæs July 23 2007.

Peter, in alliance with like-minded, differentiates between products used in different hospitals. By differentiating the qualification criteria for products for different user organizations with same functional needs, the user group made the inclusion of environmental friendly products into the procurement agreement possible, despite their higher price. Here, PVC-freeness was *privileged over price by combining it to a new subcategory* under a condition of suitable functionality.

### **Privileging environmental friendliness as a product assortment criteria**

The procurement process in the municipality of Solbæk provides us with yet another example of how environmental friendliness is related to other product qualities. According to Helle, there has to be at least one PVC-free alternative on the list of negotiated products for those users who want to use it. Once it is secured that the assortment provided by the agreement includes an environmentally better alternative, the responsibility for carrying out a green procurement decision is left to the municipal institutions.

Helle: "There has to be a PVC-free alternative available. But mostly people know PVC-bags. So we made sure that the others were also included in the assortment for those who wanted to buy more environmentally friendly."<sup>218</sup> (translated from Danish by author)

In the case of Solbæk, environmental friendliness thus becomes a feature that participates in qualifying the product – though in quite a different manner than in the previous examples. Rather than a product criterion, PVC-freeness becomes a conditioning quality for the new product assortment in its totality. If tenders include one or more PVC-free products they will not be disqualified from the comparison between tenders as long as the emerging product assortment does not have any PVC-free products. In the case of a hypothetical situation where the compiled assortment of urine bags would not include PVC-free products, PVC-freeness might become *privileged over price and functionality as long as the condition of at least one PVC-product in the assortment is fulfilled*.

However, enacting environmental freeness as a quality of a product assortment can also act as a disqualifying element at the product level. In principle, *if the product*

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<sup>218</sup> Interview with Helle, procurement officer in the Municipality of Solbæk September 28 2006/April 16 2007.

*assortment already includes PVC-free products, environmental friendliness as PVC-freeness does not need to be regarded in relation to other products.*

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In the public procurement agreement processes, the superiority of functionality and price in relation to environmental friendliness is obvious: environmental friendliness gains strength predominantly if it can co-exist with particular price and functionality requirements.<sup>219</sup> However, situations can occur where environmental friendliness is exceptionally either supported by other product qualities or privileged over other product or assortment qualities, such as price. When privileging of environmental friendliness takes place, it is – in one way or another – restricted or conditioned. Following Sjögren and Helgesson (2007), one could see privileging taking a form of partial privileging where no single quality (here environmental friendliness) is fully privileged over all others (Sjögren and Helgesson 2007: 233).

This preference order seems to be self evident to my interview persons. In the following, however, I will attempt to discuss three issues that might contribute to making environmental friendliness an unstable quality. Environmental friendliness is disregarded as a relevant product quality by suggesting that it is both absolutely and relatively insignificant in terms of its environmental impacts. Environment can be juxtaposed with the very strongest of qualities, functionality, by a tight budget. Environmental friendliness as a product quality can also become a quality that is simply not available because the suppliers have not included products that procurers would define as environmentally friendly in their tenders.

### 6.1.2. Environmental impacts of PVC as absolutely and relatively insignificant

In the county of Fredenshus, environmental friendliness is always seen as less significant than both price and functionality. The reason for this seems to be the

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<sup>219</sup> This order of priorities seems to go beyond the organizations in focus. According to Palle, a sales consultant in a Danish trading company for medical devices, price – and to a certain extent functionality – are those qualities he has experienced as decisive in terms of procurement agreements in counties and municipalities (Interview with Palle November 27 2006).



priority attributed to functional and economic concerns. However, the significance of the particular enactment of environmental friendliness, PVC-freeness, in general is also at stake.

Jonna: "But for the urine bag that hangs on the bed, the environmental impact comes from incineration. On the contrary, the other plastics might take a lot of energy to produce. And then we can discuss what and what not. It is an assessment of how much PVC we burn and how much it affects anything in comparison with so many other things. So many PVC products have been changed to non-PVC where it has been easier."<sup>220</sup> (translated from Danish by author)

Jonna is not quite certain that PVC-freeness necessarily makes the bag environmentally friendlier than other bags. She questions the appropriateness of the distinction between environmental friendliness and harmfulness that is made in relation to PVC-freeness. By questioning the absolute impact of PVC, she opens the framing of environmental friendliness as PVC-freeness to possible overflows (cf. Callon 1998a: 252-53). Furthermore, Jonna relates the environmental harmfulness of PVC-freeness to the amount of PVC that is used in the hospital sector. Because it has been out-phased successfully in many other product groups, Jonna does not think it is necessary to make compromises with other product qualities when trying to buy PVC-free products. By including the urine bag in a population of medical devices, Jonna shifts the calculative frame to encompass the environmental impacts related to all medical devices. Thereby, the environmental impacts related to urine bags become relative.

Interestingly, neither Peter nor Helle express similar kinds of reasoning for not buying PVC-free products. They do not question the distinction made between environmentally friendly and harmful urine bags according to their PVC-freeness. Also, they do not mention urine bags as such as insignificant for reducing PVC-use.<sup>221</sup>

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<sup>220</sup> Interview with Jonna, procurement officer in the County of Fredenshus October 4 2006/May 29 2007.

<sup>221</sup> Interview with Helle, procurement officer in the Municipality of Solbæk September 28 2006/April 16 2007 and interview with Peter, procurement officer in the County of Arnæs July 23 2007.

### 6.1.3. Juxtaposing environmental friendliness with functionality

Environmental friendliness and functionality can also be juxtaposed by restricted finances. In situations where environmentally friendly bags are more expensive than other functionally equivalent bags, and where procurement officers feel an economic pressure, the limited budget forces a prioritizing between different qualities, functionality and environmental friendliness. Indeed, my interviews with Peter and Jonna reflect a budgetary pressure on the procurement processes.

Jonna: "so, we have always heard that public procurement should act as an example for others in relation to environment and everything else. And we try to do that. The problem is that at the same time we should make the best use of the tax-payers' money in order to, and that is something we hear all the time too, create savings in the hospitals so that hospitals can make the best of their money."<sup>222</sup> (translated from Danish by author)

Peter: "We want to have environmentally friendly products but we also have to consider that if it concerns some large parts of our budget we just cannot [if the products are very expensive]."<sup>223</sup> (translated from Danish by author)

According to Jonna, however, there is always money for the right functionality.

Jonna: "One could say that if the level [of functionality] that is defined by the users is assessed to be the right level there is no bag that is too expensive."<sup>224</sup> (translated from Danish by author)

Limited budgets make it necessary to compare tenders and product prices. This forces the user group to prioritize between other product qualities if prices for functionally appropriate devices are different. The budget thus becomes a prioritization device as it performs the economic rationale inscribed (Akrich 1992:

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<sup>222</sup> Interview with Jonna, procurement officer in the County of Fredenshus October 4 2006/May 29 2007.

<sup>223</sup> Interview with Peter, procurement officer in the County of Arnæs July 23 2007.

<sup>224</sup> Interview with Jonna, procurement officer in the County of Fredenshus October 4 2006/May 29 2007.

208) to it. The stability of environmental friendliness is made fragile in its relation to functionality or price.

#### 6.1.4. Blocking out the environment

As previously mentioned, in the county of Fredenshus, PVC-freeness is the foremost issue that is considered in relation to the environment even though other information has also been requested from the producers. In spite of this, environmental considerations do not play a role in the assessment of tenders in the recent tender process. This can not be done as no PVC-free bags are included in any of the tenders. By not tendering PVC-free products, the suppliers participate in defining the calculative space for the comparison of products. Environmental friendliness as PVC-freeness cannot participate in the comparison of different products as it *is kept outside from comparisons by the suppliers*.

When Jonna tells me of the product specifications she defines together with the user group, she points out that in the county of Fredenshus, the call for tenders specifies products for hospital use that is mainly for bed-ridden patients. More complex products that enable independent life and different activities are not included in the call for tenders because of their limited use. The two PVC-free bags that to my knowledge are available on the Danish market, Moveen and Conveen Security+, are over-functional to the group of products that Jonna focuses upon.<sup>225</sup> This observation emphasizes the significance of the activities carried out in order to shape the market object. If no drainage bags that can be defined as PVC-free are produced in the specified product type, environmental friendliness – as long as it is defined as equal to PVC-freeness – cannot participate in the comparison of concrete products.

Interestingly, product specifications in the municipality of Solbæk play a double role in relation to allowing in and blocking out environmentally friendly products. The product specifications given in the tendering documents mention specific product names. This, as already mentioned, defined the quality expectations in a detailed manner and functioned as a powerful inscription device for the suppliers. Thus, all tenders Helle received consisted of more or less the same products.

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<sup>225</sup> Interview with Jonna, procurement officer in the County of Fredenshus October 4 2006/May 29 2007.

As the Conveen Security+ bags were also requested in the product specifications, Helle had a possibility to include a PVC-free bag in the list of negotiated products. Apart from those products that Helle tells me are PVC-free, I do not know what exact products are requested.<sup>226</sup> Therefore, I cannot assess whether it would have been possible to replace some of the other products with products from the other available PVC-free urine bag series, Moveen. However, the way suppliers respond to the product specifications suggests that even if there would have been PVC-free alternatives for a particular type of urine bag, these would not have been included in the tenders. Suppliers bid in exactly those very products suggested in the product specifications, PVC-free or not. Again, it is suppliers that do not send in PVC-free products. However, their calculations on what to bid in are affected by the devices that circulate between the buyer and the supplier. These devices orient the product comparison towards prices of the specifically named products.

These two examples suggest that not only the preference order established between environmental friendliness and other product qualities is decisive in terms of how environmental friendliness is stabilized or destabilized as a product quality. Also issues such as availability of products and the ways market devices like product specifications participate in translating the preferences of the buyer to the supplier are of significance.

### 6.1.5. Summing up

In the procurement agreement processes, environmental friendliness as a product quality is mostly related to PVC-freeness, and sometimes to phthalates. Defining environmental friendliness in this particular way makes it calculable as a product quality and thereby easier to include in the comparison between products.

In the procurement agreement processes, environmental friendliness is coordinated and ordered together with other product qualities when tenders are compared with each other. The comparison takes place in order to achieve an agreement which rules out some of the products and suppliers from commercial cooperation with the buyers and establishes a transactional relation between the buyer and one or several of the suppliers. Through the procurement agreement, the amount and type

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<sup>226</sup> Interview with Helle, procurement officer in the Municipality of Solbæk September 28 2006/April 16 2007.

of products that can participate in the process of qualification becomes restricted. The significance of functionality is strengthened and signalled in all parts of the procurement agreement processes in question. The source of the priority of functionality is evident in the way products are defined: products are bought for use in particular situations; they have a task which they are expected to be able to carry out, bodies that they are going to be attached to. Besides functionality, price is also a decisive quality. This is strengthened by a budget that creates limits for what can be bought – although sometimes the budget also enables the privileging of environmental friendliness over price, at least to a certain extent. Environmental friendliness is thus always dependent on the co-existence of a level of quality and price that are judged to be acceptable.

In my interviews, the role of environmental friendliness in these processes, then, becomes that of a *dependent quality*. It is under no circumstances unconditionally privileged over other qualities though sometimes supported by these as in the case of health concerns supporting environmental concerns. However, three forms of privileging of environmental friendliness over other product qualities exist. Environmental friendliness can be *privileged over price up to a certain price level or within a certain subcategory* of buyers. Furthermore, as in the case of the municipality of Solbæk, it can be *privileged over other product qualities as long as there are no other PVC-free products in the product assortment*. This practice, however, also has an adverse effect: environmental friendliness as a product quality of a particular product becomes disregarded or at least dependent on the co-existence of a defined level of functionality and price if there already are one or several other environmentally friendly products in the assortment. Privileging – though in limited form – only takes place in two of my case organizations, the county of Arnæs and the municipality of Solbæk.

I argue for the existence of several different ways to either keep environmental friendliness away from product comparisons or to subordinate it to functionality and price. First of all, significance of environmental impacts of PVC is questioned. Secondly, environmental friendliness as a product quality can be juxtaposed with functionality because of budgetary restrictions. Thirdly and lastly, environmental friendliness can be blocked out from the product comparison by issues that emerge in the interaction between buyers and suppliers. Two examples of this were given: suppliers not producing environmentally friendly products in particular categories

and specific product names in product specifications working as inscription devices over any other product qualities.

No unitary principle of coordinating environmental friendliness with other product qualities exist: practices and results vary from location to location and sometimes from time to time. Choosing a product is enabled by establishing a calculative space that allows for comparison between different products. This calculative space is formed during the process of making a public procurement agreement. In the processes under scrutiny, calculative spaces appear as processes, changing as a result of mobilizing new actors, data sheets, suppliers, user groups, budgets, tenders, product samples, product descriptions, and modalities of comparing tenders and products with each other. Including environmental parameters in the call for tenders, for example, makes it possible to introduce this aspect into the product comparison. In the municipality of Solbæk, the product specifications given in the call for tenders shape the calculative space in a particular way: only those products named in the specifications are bid in. In the case of Fredenshus, suppliers make it impossible to include PVC-freeness in these calculations: they do not offer any products that would be classified as PVC-free.

The combination of different products, some environmentally friendly and others not, on these lists of negotiated products is a result of coordinating environmental friendliness with other product qualities in the calculative spaces. In the three organizations, PVC-freeness is not privileged over other product qualities across the whole product assortment. Therefore, none of the procurement agreements offers a stabilization of PVC-freeness as a product quality for all products covered by the procurement agreement. This means that PVC-freeness is not an automatic preset qualification criterion in successive events where particular products are chosen from the list of negotiated products. In the next part of this chapter, I will investigate the role of environmental friendliness and the degree of stability it acquires when professional and end-users – often and mostly restricted by a pre-existing procurement agreement – choose between products.

## 6.2. Environmental friendliness in needs appraisals in county hospitals and municipal institutions

In this subchapter, I investigate whether and how environmental friendliness stabilizes or destabilizes as a product quality in needs appraisals carried out by nine nurses and two health care assistants in urological departments in hospitals in the counties of Arnæs and Fredenshus, in home nursing, care homes and centres for people with disabilities in the municipality of Solbæk and in two regional rehabilitation centres for people with disabilities. These nurses and assistants play a significant role in choosing a particular bag to the end-users and thereby in qualifying urine bags based on particular qualities. The nurses choose the bag to be used if it is for temporary use. In case of permanent use, nurses recommend a particular bag or a bag with particular functions to be used. The official financing decision on the long term use is made by administrators in the municipality.<sup>227</sup> In this case, all nurses and health care assistants follow procurement agreements which limit the assortment of bags they can choose from – needs assessment thereby present a next step in the process of qualification-requalification of a urine bag.<sup>228</sup>

Environmental concerns regarding urine bags only play a very limited role – if any at all – in the daily practices of most nurses I talked to. In the interviews, however, nurses Vera from a county hospital in the county of Fredenshus, Lotte from a county hospital in the county of Arnæs, Hans from a rehabilitation centre loosely affiliated with the county of Fredenshus, and Laila from a care home in Solbæk, link PVC-freeness with environmental friendliness.<sup>229</sup>

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<sup>227</sup> This distinction is given in the law. According to an announcement from the Ministry of Domestic Affairs (Indenrigsministeriet 1975), counties finance the short term use of urine bags in hospitals and municipalities finance the use of a more permanent character.

<sup>228</sup> Nurses and health care assistants might also influence the choice of bags available in the procurement contract by either participating in the user group that decides upon the public procurement agreement or, in smaller institutions, being the one responsible for making the contract. The main focus in this subchapter, however, is on needs assessments.

<sup>229</sup> Interview with Vera, nurse in county hospital E in the County of Fredenshus October 2 2006, interview with Lotte, nurse in county hospital C in the County of Arnæs October 17 2006, interview with Laila, head nurse in self administrating care home A in the municipality of Solbæk November 1 2006 November 1 2006 and interview with Hans, nurse in rehabilitation clinic A June 6 2006.

Vera: "Sometimes we do talk about how we would like to have those fancy products [refers to Conveen Security+ as a PVC-free urine bag], but..."

Satu: "Is this because of their functional properties?"

Vera: "yes, but also because of the environment. Both functionality and because of the patients, because it is better for them if they'd have something else next to their skin. And because of the environment."<sup>230</sup>  
(translated from Danish by author)

In addition, Henriette, a nurse from a county hospital in the county of Sellå, Vera, Hans and Marina, a health care assistant in a centre for people with disability in Solbæk, also bring up waste as a relevant issue regarding urine bags.<sup>231</sup>

Hans: "What we dream of is that you could just throw them [urine bags] anywhere and they would become dissolved."<sup>232</sup> (translated from Danish by author)

Henriette: "I would say that that about the environment, I think we mostly talk about waste."<sup>233</sup> (translated from Danish by author)

Environmental concerns are not supported by systematic information dissemination from the suppliers or procurement officers. None of my interview persons mention getting any environment related information from the procurement office in their county or municipality.<sup>234</sup> Product packaging does not have information on the product materials and the substances used in products.

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<sup>230</sup> Interview with Vera, nurse in county hospital E in the County of Fredenshus October 2 2006.

<sup>231</sup> Interview with Henriette, Nurse in county hospital F in the County of Sellå October 20 2006, interview with Vera, nurse in county hospital E in the County of Fredenshus October 2 2006, interview with Hans, nurse in rehabilitation clinic A June 6 2006 and interview with Marina, health care assistant in a centre for disabled people in the municipality of Solbæk September 29 2006.

<sup>232</sup> Interview with Hans, nurse in rehabilitation clinic A June 6 2006.

<sup>233</sup> Interview with Henriette, Nurse in county hospital F in the County of Sellå October 20 2006.

<sup>234</sup> Peter who carries out the public procurement agreements that Lotte's hospital is subordinated to indicates if the products are PVC or PVC-free in the database on negotiated products. This information, however, is not something Lotte or other nurses see – it is used by the person who takes care of the daily ordering and deliverance of products in the hospital. Lotte has been a part of the user group for procurement of drainage bags. As a member of the user group, she received information about the environmental impacts of PVC (interview with Peter, procurement officer in the County of Arnæs July 23 2007 and interview with Lotte, nurse in county hospital C in the County of Arnæs October 17 2006).



Besides the product lists, municipal nurses, Kira, a health care assistant from a rehabilitation centre loosely affiliated with the county of Arnæs, and Hans use a Kirudan catalogue where a number of urine bags are presented.<sup>235</sup> The information given in the catalogue differs slightly for each product. However, a product number, product name, packaging size, length of tube as well as other specific functionalities are given for each urine bag. While my other interview persons do not know whether there is any environment related information in this catalogue, Kira points out that Conveen Security+ is described as a urine bag made of a material that is "more environmentally friendly than PVC".<sup>236</sup> Kira, Lotte and Henriette all say that the sales consultants sometimes inform about the substances and product materials. Hans sometimes asks the visiting sales consultants about environment and products. The municipal nurses do not recall any sales consultants providing environmental information about urine bags.<sup>237</sup>

Most of the nurses have never encountered a client who would have inquired about what the bag was made of or whether there was PVC or phthalates in the product. Hans, however, has experienced some patients that have been interested in the environmental impacts of the bags.

Hans: "Our patients are just as conscious about consumer choices and environment as anybody else... They also ask if it [the bag] can be dissolved in the nature. So I think it [environmental friendliness] is an important thing. And packaging is also important. It takes a lot of space when one has to have it around at home in ones toilet where one maybe already has a big wheel chair and many other assistive devices."<sup>238</sup>  
(translated from Danish by author)

Environmental friendliness is not a product feature that receives a lot of attention from any of my interview persons. Even more so, a distinction between

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<sup>235</sup> Interview with Kira, health care assistant in rehabilitation clinic B November 9 2006 and interview with Hans, nurse in rehabilitation clinic A June 6 2006.

<sup>236</sup> Interview with Kira, health care assistant in rehabilitation clinic B November 9 2006.

<sup>237</sup> Interview with Vera, nurse in county hospital E in the County of Fredenshus October 2 2006, interview with Robin, nurse in county hospital D in the County of Fredenshus November 28 2006, interview with Hans, nurse in rehabilitation clinic A June 6 2006, interview with Laila, head nurse in self administrating care home A in the municipality of Solbæk November 1 2006, interview with Lotte, nurse in county hospital C in the County of Arnæs October 17 2006, interview with Marina, health care assistant in a centre for disabled people in the municipality of Solbæk September 29 2006,

<sup>238</sup> Interview with Hans, nurse in rehabilitation clinic A June 6 2006.

environmentally harmful or hazardous products in regard to the products on the negotiated list is only enacted by Lotte and Vera in relation to PVC and Henriette and Marina in relation to waste.<sup>239</sup>

In the following, I will discuss how the order of qualities is organized in terms of qualifying a product for recommendation and whether environmental friendliness achieves stability when this preference order is folded out in the practice of choosing a bag. In the last part of this subchapter, I will investigate how and on what grounds environmental friendliness is kept absent from the comparison between different products and product qualities.

### 6.2.1. Ordering qualities

When nurses choose a particular bag to a particular client they enter into a process that, following Callon (1998b), can be characterized as a calculative practice of comparing different products and assessing the needs of the end-user and the treatment. In this section, I will discuss the modalities of choosing a bag and making different product qualities significant in terms of qualifying the product.

Due to the infection risk related to urine drainage systems, a decision to use urine bags on a patient or client is only taken when other alternatives are not possible, my interview persons tell me. When deciding which drainage device to use, the first issue all hospital nurses consider is whether a sterile bag should be used. If the bag is to be used for at short time only it is in principle possible to keep it clean, thus a sterile bag is chosen. If the bag is for longer use the bag cannot be kept clean and a non-sterile version can be used.

The next issue is the functionality of the bag. In my interviews, three different situations of use were mentioned: temporary hospital use, temporary use at home between treatments or while recovering and permanent use at home or in care taking institution. If the bag is for short term hospital use, the hospital nurses

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<sup>239</sup> Interview with Lotte, nurse in county hospital C in the County of Arnæs October 17 2006 and interview with Vera, nurse in county hospital E in the County of Fredenshus October 2 2006, interview with Henriette, nurse in county hospital F in the County of Sellå October 20 2006 and interview with Marina, health care assistant in a centre for disabled people in the municipality of Solbæk September 29 2006.

mainly use a simple standard bag, and if available, one where a night bag can be attached to the day bag to decrease the need to change bags and thereby increase an infection risk. Some of the functionality issues that are considered when choosing a urine bag include the ability and need of the client to operate the bag and thereby to achieve a greater degree of independence, i.e. the ability to empty and attach it herself, the functional needs for the use of the bag: size, mode of emptying, discreteness, level and type of activity that the bag should allow for, place of attachment, length of tube, frequency of change<sup>240</sup> and so forth. Hamid, a nurse in one of the home nursing units in the municipality of Solbæk articulates the order between these qualities as follows:

Hamid: "Mostly we look at functionality first. Whether they are able to operate the bag themselves, the younger with disabilities or the older with reduced motorics in her hands. They want to do it on their own. And if we find something that enables this, good. And then come the size and volume. But primarily that they are themselves able to."<sup>241</sup>  
(translated from Danish by author)

Hans and Kira from the special clinics are very much oriented towards comfort, discreteness, skin-friendliness and whether the user can use the bag herself. In principle, both Hans, Kira, Lotte and Henriette try to use a day bag that can have a night bag attached to it so the day bag can be kept in place for several days at a time. Furthermore, Kalle and Julie, both home nurses in home nursing units in the municipality of Solbæk, Laila and Marianne, both head nurses in care homes in Solbæk, Marina, and Vera tell me that they mostly use the same bag. Kalle, Laila, Marianne and Julie who all work with elderly people and terminally ill note that most of the time a standard bag fulfils the needs.<sup>242</sup>

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<sup>240</sup> Generally, according to the nurses, the lower the changing frequency the better in terms of risk for infections.

<sup>241</sup> Interview with Hamid, nurse in home nursing unit B in the municipality of Solbæk November 30 2006.

<sup>242</sup> Interview with Hans, nurse in rehabilitation clinic A June 6 2006, interview with Kira, health care assistant in rehabilitation clinic B November 9 2006, interview with Lotte, nurse in county hospital C in the County of Arnæs October 17 2006, interview with Henriette, nurse in county hospital F in the County of Sellå October 20 2006, interview with Kalle, nurse in home nursing unit A in the municipality of Solbæk November 13 2006, interview with Julie, nurse in home nursing unit A in the municipality of Solbæk November 1 2006, interview with Laila, head nurse in self administrating care home A in the municipality of Solbæk November 1 2006, interview with Marianne, head nurse care home B in the

The main focus of the nurses, then, is the functionality of the bag. However, their freedom to choose can be restricted by two issues: availability and price of the bags. The products that are used at Henriette's, Lotte's, Vera's and Robin's hospital departments are chosen from a list which indicates the negotiated prices for those products included in the county public procurement contracts.<sup>243</sup> Robin is a nurse in the county of Fredenshus, although she works in another hospital than Vera. All the departments have their own budgets. Also different municipal institutions with the exception of self-administrating institutions like Laila's work place are expected to make use of the public procurement contract in the municipality of Solbæk. Nurses are normally allowed to purchase outside of the negotiated lists, though only in limited amounts. For Vera's and Robin's departments, for example, it is possible to purchase up to 10% of their budgets outside of the contract. In the municipality of Solbæk, the purchases have to be made from the supplier who has been awarded the contract, Kirudan, a Danish trading company for medical devices. The clinics where Hans and Kira work have their own local procurement agreements with some suppliers. Hans and Kira whose patients are normally permanent users feel less restricted to choose outside of the list.<sup>244</sup>

There seems to be great differences between the amount of different bags and the type and functionality of bags between the different negotiated lists. Availability of bags is mentioned as a restriction in choosing a bag with needed functionality, especially when the lists of negotiated products do not include any high-functionality products. This can clearly be seen in Vera's and Robin's case. Vera tells me that at her department, the clients do not necessarily get the products that would be best for them while at the hospital or as a temporary user of the bag. Rather, Vera chooses a product that is closest to her needs and available on the negotiated lists. The bags that are used at Vera's department are inexpensive standard bags.

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municipality of Solbæk November 16 2006 and interview with Vera, nurse in county hospital E in the County of Fredenshus October 2 2006.

<sup>243</sup> Interview with Henriette, Nurse in county hospital F in the County of Sellå October 20 2006, interview with Lotte, nurse in county hospital C in the County of Arnæs October 17 2006, interview with Vera, nurse in county hospital E in the County of Fredenshus October 2 2006 and interview with Robin, nurse in county hospital D in the County of Fredenshus November 28 2006.

<sup>244</sup> Interview with Vera, nurse in county hospital E in the County of Fredenshus October 2 2006, interview with Hans, nurse in rehabilitation clinic A June 6 2006, interview with Robin, nurse in county hospital D in the County of Fredenshus November 28 2006 and interview with Kira, health care assistant in rehabilitation clinic B November 9 2006.

Satu: "Does the patient get exactly the product she has use for even if it is more expensive? Or do you count in detail, how much money you have for each client?"

Vera: "No, we do not. It is just that we get this that we should use the things that are in the procurement contract all the time. So even though the patient has the right to get the most suitable product, it is just not the reality."<sup>245</sup> (translated from Danish by author)

Robin states that it is not only the wishes of the patient that cannot be fulfilled with the current assortment – neither can the Danish Standard 2451 on Infection Hygiene be followed.<sup>246</sup> The Danish Standard standardizes the use of urine bags in order to reduce the risk of infections, amongst other things.

The procurement agreement and the resulting list of negotiated products act as a device that restricts the choice of bags to some particular models. Yet none of the other nurses mention feeling that the list of negotiated products restricts their possibility to choose bags with different types of functionalities. This is partly explained by the types of bags that are included in the different lists of negotiated products. For instance, the present bag assortment of the municipality of Solbæk is rather extensive and the variety of bags on the list of negotiated products, indeed, enables many different types of uses. Marianne, Henriette, Vera and Robin note that due to the higher price of products outside of the list, they only rarely – if at all – purchase products outside of the procurement agreement.<sup>247</sup> Other nurses feel free to choose products also outside of the list of negotiated products.

Price considerations enter the calculations carried out by nurses in two different ways. Firstly, price plays a role in relation to which device is chosen from the list of negotiated products. Henriette seems to be the only nurse for whom economic

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<sup>245</sup> Interview with Vera, nurse in county hospital E in the County of Fredenshus October 2 2006.

<sup>246</sup> Vera, however, states that they follow the standards. Furthermore, the amount of different bags she can choose from is larger than that of Robin's. This seems to indicate that even though the hospitals where Vera and Robin work at in principle have access to the same list of negotiated products, the amount of products available in different departments and hospitals can be further restricted on their way to the different hospitals (Interview with Robin, nurse in county hospital D in the County of Fredenshus November 28 2006 and interview with Vera, nurse in county hospital E in the County of Fredenshus October 2 2006).

<sup>247</sup> Interview with Marianne, head nurse care home B in the municipality of Solbæk November 16 2006, interview with Henriette, Nurse in county hospital F in the County of Sellå October 20 2006, interview with Vera, nurse in county hospital E in the County of Fredenshus October 2 2006 and interview with Robin, nurse in county hospital D in the County of Fredenshus November 28 2006.

concerns do not really matter when choosing from the list of negotiated products. The bags she uses all cost around the same, Henriette tells me.<sup>248</sup> Secondly, as discussed above, price plays a role in relation to whether and on which occasions nurses buy from outside of the procurement agreement.

At Vera's department, there is a strong focus on choosing the urine bag that is the cheapest possible product.<sup>249</sup> Lotte, Hans, Kira, Marina, Kalle and Hamid who have a possibility to choose from rather expensive bags choose a cheaper bag with lower functionality if there is no need to use the bag for several days in a row or if the patient cannot operate any bags on her own. However, none of them mention that they would not choose a particular bag which would enable a client to lead a more independent life for economic reasons.<sup>250</sup> For these nurses and assistants, price, then, is secondary to functionality when choosing bags.

Marianne: "We use what we have a need for."<sup>251</sup> (translated from Danish by author)

Marina: "I do not want to say that I do not think about the price, because maybe I do. But it is not the most important thing. What is most important is what works for the person."<sup>252</sup> (translated from Danish by author)

As many of the more expensive bags can be used for several days in a row, their use in total becomes cheaper if used for a longer time which also makes it possible for the nurses to choose them when needed for longer periods.

As we have seen, functionality, sterility, familiarity, availability and price seem to be the most important qualities when choosing a bag for use in hospitals, clinics

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<sup>248</sup> Interview with Henriette, nurse in county hospital F in the County of Sellå October 20 2006.

<sup>249</sup> Interview with Vera, nurse in county hospital E in the County of Fredenshus October 2 2006.

<sup>250</sup> Interview with Lotte, nurse in county hospital C in the County of Arnæs October 17 2006, interview with Hans, nurse in rehabilitation clinic A June 6 2006., interview with Kira, health care assistant in rehabilitation clinic B November 9 2006, interview with Marina, health care assistant in a centre for disabled people in the municipality of Solbæk September 29 2006, interview with Kalle, nurse in home nursing unit A in the municipality of Solbæk November 13 2006 and interview with Hamid, nurse in home nursing unit B in the municipality of Solbæk November 30 2006.

<sup>251</sup> Interview with Marianne, head nurse care home B in the municipality of Solbæk November 16 2006 .

<sup>252</sup> Interview with Marina, health care assistant in a centre for disabled people in the municipality of Solbæk September 29 2006.

and shorter uses at home. In general, environmental friendliness is not considered as a product quality when nurses choose urine bags for a particular patient. Marina, Julia, Marianne and Kalle are quite explicit about this.

Marina: "I do not think about the environment [when choosing the product]."<sup>253</sup> (translated from Danish by author)

Kalle: "I have to admit that I have never thought whether the bags are environmentally friendly."<sup>254</sup> (translated from Danish by author)

Marianne: I have to say that we are not so environmentally conscious here. We order what we need."<sup>255</sup> (translated from Danish by author)

### **Environmental friendliness regarded as added-value to other qualities**

Despite the general absence of environmental friendliness as a product comparison criterion, on three occasions, environmental friendliness enters into the calculations when choosing bags. In these cases, however, environmental friendliness is only regarded after the appropriate functionality and price have been settled. The first incident is related to Henriette's attempts to reduce the amount of waste. In the interview, Henriette tells me that she has been able to bring down the amount of urine bags used.

Henriette: "We talk a lot about waste."

Satu: "What do you do about it?"

Henriette: "Well, what we do is that we do not change the bag too often."<sup>256</sup> (translated from Danish by author)

This, however, has not been done because of environmental reasons. Rather, the reason is linked to fulfilling a standard for the use of urine bags, the Danish Standard, that concentrates on health in relation to the use of drainage bags and minimizing the risk related to bacteria. In order to follow the standard she has to choose leg and bed bags that can be emptied and leg bags that can be attached to

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<sup>253</sup> Interview with Marina, health care assistant in a centre for disabled people in the municipality of Solbæk September 29 2006.

<sup>254</sup> Interview with Kalle, nurse in home nursing unit A in the municipality of Solbæk November 13 2006.

<sup>255</sup> Interview with Marianne, head nurse care home B in the municipality of Solbæk November 16 2006.

<sup>256</sup> Interview with Henriette, nurse in county hospital F in the County of Søllå October 20 2006.

larger night bags. Furthermore, the bags have to allow for a longer period of use by being attachable and emptiable.

The main incentive for her to follow the standard, then, is the health of the patient as defined in the standard. Minimizing waste makes following the standard even more preferable. Therefore, environmental friendliness is regarded as a positive by-product of reducing a risk in a more significant area, health, when choosing the bags that can live up to the long periods of use. Environmental friendliness is *related to other product qualities as added value*.

Also Marina mentions one specific situation where she has considered environmental issues in relation to urine bags. At some point, a patient was rehabilitated from hospital with a Conveen Security+ urine bag which made a good impression on Marina. Even today she describes Conveen Security functionally as "the Rolls Royce of urine bags". However, the bag was expensive and it was not until Marina realized that its usage times could be extended to up to seven days that she started to use the bag on her clients. Conveen Security+ bags, she tells me, can be used for seven days at a time as their inlet tube does not allow the bacteria to migrate from the bag to the catheter in the body of the client. The bags Marina normally used had to be changed twice a day, from a night bag to a day bag to a night bag. The Conveen Security+ bags can be emptied and a larger night bag can be attached to them during the night.<sup>257</sup>

A possibility to use the bag for a longer period of time suddenly made the bag more reasonably priced – and also allowed for resource savings and less waste.

Marina: "There I think we think a little bit about resources, the environment. That we do not throw away a bag every day, but only do so once a week."<sup>258</sup> (translated from Danish by author)

Changing the frame of calculation from calculating on the price of a bag to calculating on the price per use changed the result of the comparison between

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<sup>257</sup> Interview with Marina, health care assistant in a centre for disabled people in the municipality of Solbæk September 29 2006.

<sup>258</sup> Interview with Marina, health care assistant in a centre for disabled people in the municipality of Solbæk September 29 2006.



different bags.<sup>259</sup> For Marina, this means that she now uses the bag even in cases where she previously assessed that its functional properties were not needed. Indeed, it has become the bag she uses most on her own clients.<sup>260</sup>

In choosing the Conveen Security+ bag, the product qualities that played the most important role were functionality and price. However, environmental friendliness becomes a positive by-product of choosing a bag that can be used for several days at a time. Again, environmental friendliness is related to other product qualities as added value.

Lotte tells me that the requirement to be able to attach a night bag to a day bag has led her to use and recommend a particular bag, Conveen Security+, that allows for a non-problematic interface between the two bags. This bag, she tells me, is also PVC-free. However, she does not recommend the bag because it is environmentally friendly.<sup>261</sup>

Satu: "So you choose it because of the good functionality?"

Lotte: Yes, and it also has some environmental benefits. But they are not the primary reason for us choosing it. It is more because it is good for the patient. It is comfortable and so forth."<sup>262</sup> (translated from Danish by author)

Furthermore, if there is no specific functional need, a standard bag is chosen, even though Lotte knows it is made of PVC.<sup>263</sup> Obviously, in these cases, environmental friendliness is a positive thing when combined with the right level of functionality. As in Henriette's and Marina's case, it is practically impossible to say whether environmental friendliness plays a role when choosing a bag. Here, Lotte does not mention that she would have disregarded another functionally suitable option in order to keep the functionally suitable PVC-free bag. Therefore, rather than being chosen because of environmental friendliness, environmental

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<sup>259</sup> This change in the calculative frame is also something that Karin, the sales consultant from Coloplast mentions as been used in marketing in order to make the price of the Conveen Security+ bags more acceptable for the buyers and users.

<sup>260</sup> Interview with Marina, health care assistant in a centre for disabled people in the municipality of Solbæk September 29 2006.

<sup>261</sup> Interview with Lotte, nurse in county hospital C in the County of Arnæs October 17 2006.

<sup>262</sup> Interview with Lotte, nurse in county hospital C in the County of Arnæs October 17 2006.

<sup>263</sup> Interview with Lotte, nurse in county hospital C in the County of Arnæs October 17 2006.

friendliness is enabled by the right level of functionality. It is also worth noting that even though Lotte and Marina talk about the Conveen Security+ bag, it is not the same version of environmental friendliness they attach to it.

### **Needs appraisals in the past**

The criteria for choosing urine bags have remained similar in the sense that functionality is the top priority for the nurses, as long as price and availability has allowed it. Henriette, Hans and Robin name one single issue that has changed the understanding of what is functionally most desirable: the Danish Standard from 2001. This standard has directed focus on the frequency with which the drainage bags are changed and therefore emphasized the importance of minimizing the flow of bacteria to the greatest extent possible. For Henriette and Hans this has meant that they have started to use bags that can be used for longer periods of time which sometimes makes it possible for them to choose a more expensive bag rather than a cheap one day standard bag. Henriette mentions that this brings down the amount of waste as well. Besides the Danish Standard, an earlier development is worth mentioning here: due to the infection risks related to urine drainage systems, urine bags have been strongly questioned as the primary treatment for continence problems and the use of them has declined since the 1980s.<sup>264</sup>

Changes that have influenced the alternatives that the nurses have been able to choose from have been the growing number of different urine bags in the market and the possibility to find information on the bags on the internet. The growing importance of economy that can be seen in my interviews with hospital nurses have also influenced the available alternatives. Robin and Vera feel that their possibilities to choose have decreased over the years due to economic pressure. Robin connects the reducing possibilities for choosing the functionally most suitable bag to the time when her department became responsible for its own budget. Another change that Hans and Kira, who both work at a rehabilitation centre, have experienced is that their clients have become more and more

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<sup>264</sup> Interview with Henriette, nurse in county hospital F in the County of Sellå October 20 2006, interview with Hans, nurse in rehabilitation clinic A June 6 2006 and interview with Robin, nurse in county hospital D in the County of Fredenshus November 28 2006.

conscious about possible choices and their rights to influence the choice of assistive device.<sup>265</sup>

Many of my interview persons recall some discussion about PVC and phthalates although mostly related to other product groups than urine bags – and mostly related to direct health effects<sup>266</sup>, not environment. The discussion has evolved around products that are either attached directly into the body, like catheters, or have to be worn on the skin, like diapers or gloves. Some nurses tell me that urine bags can very well be worn in a cotton bag or hanged on the bed side which makes the direct health effects related to urine bags rather irrelevant. Furthermore, Lotte has experienced that the nurses she trains have become more and more conscious about problems related to PVC-waste over the past 10 years. She also maintains that the sales consultants have become more active in using PVC-freeness as a sales argument.<sup>267</sup> Despite of the interest Lotte has encountered and the general knowledge about the discussion on PVC and phthaltes, as we have seen, environmental friendliness as PVC-freeness does not play a role in relation to the way my interview persons choose urine bags today. Furthermore, none of my interview persons mention that PVC-freeness would have played a greater role in their practice of choosing bags in the past neither for health or environmental reasons.

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To sum up, environmental friendliness does not enter the practices where a particular urine bag is chosen or recommended – apart from the three above mentioned occasions where PVC-freeness of the chosen bag and reducing the amount of waste, respectively, are seen as added value to the choice of bags. Even in these cases, environmental friendliness only becomes a considered quality when functionality and price related issues have been settled. In general, environmental friendliness is not considered in any ways in these activities – no coordination with

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<sup>265</sup> Interview with Robin, nurse in county hospital D in the County of Fredenshus November 28 2006, interview with Vera, nurse in county hospital E in the County of Fredenshus October 2 2006, interview with Hans, nurse in rehabilitation clinic A June 6 2006 and interview with Kira, health care assistant in rehabilitation clinic B November 9 2006.

<sup>266</sup> There is no single understanding of what these health effects are. Some of my interview persons talk about allergies.

<sup>267</sup> Interview with Lotte, nurse in county hospital C in the County of Arnæs October 17 2006.

other product qualities seem to happen. Rather, environmental friendliness is a non-existing quality.

In the following, I will raise some issues that might have contributed to keeping environmental friendliness out of the group of qualities that are enacted in relation to urine bags and from the coordination between different qualities. However, it has to be kept in mind that for many of the nurses, environmental friendliness is an absent quality. For those that recognize it in some ways, its absence from the ordering of qualities is not necessarily intentional.

### 6.2.2. Drainage bags as insignificant in terms of relative impact on environment

In Laila's organization the environmental concerns, especially in regard to PVC, are taken into consideration in those product groups that are used the most, i.e. diapers and the plastic used in supplemental bed sheets. As mentioned before, Laila, unlike the other nurses, is responsible for the procurement contract for her institution. Therefore, her approach to environmental friendliness is not exercised in daily practice and needs appraisals, but rather when choosing the products for the procurement contract. These two practices, however, are highly intertwined: the products she chooses to buy have to include the functionalities she deems necessary in order to fulfil the needs of her clients.<sup>268</sup>

Laila is aware of PVC-related problems and has tried to purchase PVC-free products in larger procurement decisions. She considers urine bags, however, to be such a small part of the total amount of products purchased by the care home that she has not thought about going PVC-free also in this product category.

Laila: "Should I be honest, I'd say that I have not really considered the environment as such because I think we use so little of them [urine bags] But many small make many..."<sup>269</sup> (translated from Danish by author)

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<sup>268</sup> Interview with Laila, head nurse in self administrating care home A in the municipality of Solbæk November 1 2006.

<sup>269</sup> Interview with Laila, head nurse in self administrating care home A in the municipality of Solbæk November 1 2006.

Laila is the only one directly articulating a reason for not taking environmental friendliness into consideration: the amount of bags used is so small, that she has directed her efforts towards buying green in the larger product groups in order to maximise her effect on the environment. Environmental friendliness, in her case, PVC-freeness, is disregarded from the coordination of product qualities on the grounds of a *small effect on the environment* in relation to other product groups. The frame for calculating environmental impacts is extended to include all the product groups, not only urine bags: The environmental impacts related to urine bags are thus approached in relative terms.

### 6.2.3. Environmental friendliness as an expected norm

The municipal nurses Marina, Kalle, Julie and Hamid indicate that they expect that the environmental impacts of the bags are considered by someone else already before the bags reach them.<sup>270</sup>

Hamid: "I trust the governmental bill and that they [producers] follow it. I trust all the enterprises to do that until something else is proven."<sup>271</sup>  
(translated from Danish by author)

Julie: "We do not think about the environment. That is done by others, those who buy the products."<sup>272</sup> (translated from Danish by author)

Marina, Kalle, Julie and Hamid state that they trust that somebody else, suppliers, legal entities or procurers, has dealt with environmental issues regarding the products they are offered and expect the bags to have an acceptable environmental performance. Therefore, they see no reason to take environmental friendliness into consideration in the actual comparison. Environmental friendliness is absent from the comparison of product qualities, yet it is not actively disregarded. Rather, environmental friendliness as a product quality is *ruled out from the considerations*

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<sup>270</sup> Interview with Marina, health care assistant in a centre for disabled people in the municipality of Solbæk September 29 2006, interview with Kalle, nurse in home nursing unit A in the municipality of Solbæk November 13 2006, interview with Julie, nurse in home nursing unit A in the municipality of Solbæk November 1 2006 and interview with Hamid, nurse in home nursing unit B in the municipality of Solbæk November 30 2006.

<sup>271</sup> Interview with Hamid, nurse in home nursing unit B in the municipality of Solbæk November 30 2006.

<sup>272</sup> Interview with Julie, nurse in home nursing unit A in the municipality of Solbæk November 1 2006.

*as being an expected norm*. Interestingly, Helle, the procurement officer in charge of the procurement agreement, clearly aims at delegating the choice to those choosing the bag by providing an alternative. She explains that the product assortment ought to include at least one PVC-free product for those interested in the environment could choose it.<sup>273</sup> This indicates a mutual delegation of responsibility resulting in environmental friendliness becoming absent from qualification of any other urine bag but the one Helle secures to be PVC-free.

#### 6.2.4. Environmental friendliness blocked out by the previously established order

Sometimes environmental friendliness becomes disregarded from the coordination of product qualities already before the products are compared with each other. In the case of Vera, disregarding environmental friendliness as PVC-freeness is forced by a list of negotiated products that, to her knowledge, does not include any PVC-free products at all. Furthermore, the budget is not seen as generous enough for buying products from outside of the list of negotiated products even to the extent it would be allowed to. Non-negotiated products do not, I am told, have as favourable prices as those on the list.<sup>274</sup> Thus, the list of negotiated products has become an obligatory passage point (Callon 1986: 202-3 ) due to which all product qualities that cannot be attached to the products on the list are made non-achievable. This is a form of addition (Mol 2002: 55): some qualities are privileged and others disregarded by *relating them to a previously established order*, here the inclusion on the list of negotiated products. The list of negotiated products acquires a role of a powerful framing device: what is on the list can be taken into account, what is outside of the list is not calculated. The absence of PVC-free products from the list becomes crucial as the calculative space is formed around the products and product qualities that are available.

In Vera's case, the possible qualities of the competing products are crafted in an interplay between available products, individual needs assessment practices and the budget. In this interplay, the functional qualities that the nurse and the client assess to be needed from the product are proposed while consulting the list of

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<sup>273</sup> Interview with Helle, procurement officer in the Municipality of Solbæk September 28 2006/April 16 2007.

<sup>274</sup> Interview with Vera, nurse in county hospital E in the County of Fredenshus October 2 2006.

readily available products included in the county procurement contract. The functional qualities needed are thus subordinated to those that the readily available products are equipped with. This subordination is forced with a reference to the budget and commitment to the procurement contract. The only exception to this subordination is when a deviation from the list is sought for medical reasons.

The list of negotiated products stabilizes a particular framing for the transaction and thereby also a boarder for a possible network built in this transaction. In principle, however, no network is inherently irreversible (Callon 1991: 154-155): Vera could just as well buy all or the allowed 10% of her products from another supplier. However, extending the network to PVC-free products would require breaking the ties connecting the department to the network of hospital procurers, shared procurement arrangements, most probably the budget and so forth. This network is stabilized to the point of irreversibility and it is therefore, if not impossible, at least very costly for a single member of the staff or the department to act against the prevailing decisions and practices. The script (Akrich 1992: 208) entailed in the list is powerful due to the network it brings together. There is no realistic possibility to open the decision on whether PVC-freeness is focused upon if the contract is followed. PVC-freeness does not exist as a possible quality as long as the contract is followed.

### 6.2.5. Environmental friendliness disregarded by the recommendation and financing regulations

If and when it is concluded that the patient will be using urine bags permanently, the municipality of residence is responsible for financing the bag. Upon rehabilitation of the patient, then, the nurse at the hospital usually prepares a medical recommendation for a particular type of product for the client upon her returning home. This recommendation will be used in the municipality where the further financing of the product is decided upon. However, also municipal nurses prepare recommendations. Nurses send the recommendation to the administrators of financing decisions in the municipality.

The recommendation for a particular device is sent on a specific application form used in the municipality or in the hospital to people who administrate the financing decisions. These forms have places for indicating which diagnosis has led to the

need for the particular device and which device is needed. There is no place for indicating what the bag is made of or what its environmental impacts are. According to Kalle and Hans and the three administrators I have interviewed in the municipality of Solbæk, Ulrik, Monica and Anne, the argumentation in the recommendation follows the principles laid out in the Service Act, Paragraph 97.<sup>275</sup> This paragraph obliges the municipality to finance a permanent use of assistive devices. Furthermore, the Service Law also indicates that the device has to be the most suitable model and the cheapest one available.

Monica: "There is a paragraph in the law. The device should be the best suitable and the cheapest. The best suitable is not necessarily the cheapest. It can also be the best of the cheapest. It is a bit strange. But it is this that is of importance."<sup>276</sup> (translated from Danish by author)

The recommendation is based on the assessment made in consultation with the patient. In the recommendation, hospital nurses do not usually specify products by name. In the case of the municipality of Solbæk, however, Vera gives a particular name.<sup>277</sup> Instead, the size, amount and functionality needed are specified. The municipal nurses, however also include the name of the product they wish to be chosen from the list of negotiated products. Functionality needs are assessed similarly to when assessing the need for temporary use. However, this time more focus is put on the need for the user to be able to operate the bag independently. The patient might be sent home from a hospital with another type of bag than the one that is recommended. For example Robin never recommends the type of bags she can choose from as they do not enable attaching a night bag to a day bag.<sup>278</sup> Environmental concerns like PVC-freeness are not included in the recommendation letter. Rather, recommendations strictly follow the legal basis for financing of assistive technology.

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<sup>275</sup> Interview with Kalle, nurse in home nursing unit A in the municipality of Solbæk November 13 2006, interview with Hans, nurse in rehabilitation clinic A June 6 2006, interview with Ulrik, administrator in the municipality of Solbæk October 28 2006, interview with Monica, administrator in the municipality of Solbæk November 6 2006 and interview with Anne, administrator in the municipality of Solbæk November 15 2006.

<sup>276</sup> Interview with Monica, administrator in the municipality of Solbæk November 6 2006.

<sup>277</sup> Interview with Vera, nurse in county hospital E in the County of Fredenshus October 2 2006.

<sup>278</sup> Interview with Robin, nurse in county hospital D in the County of Fredenshus November 28 2006.



Nurses know that the argumentation for the specific functionality has to be viable, especially if the recommended device exceeds the standard. The hospital nurses tell me that some municipalities can be very particular about financing more expensive devices. If nurses recommend an expensive type of bag, the contact person of the patient in the municipality sometimes requests further information on why this is recommended. According to Lotte, great differences exist between municipalities concerning their willingness to finance more expensive devices.<sup>279</sup>

In principle, the choice of urine bag can be questioned by the administrators. The three administrators I have interviewed, Ulrik, Monica and Anne, however, explain their work as being purely administrative.<sup>280</sup> In order for the recommendation to be valid it has to indicate the cause of incontinence that the client is suffering from, the permanent character of use<sup>281</sup>, what is required of the device, how many devices per week are needed and a contact person at the treating institution. If the information is given and the need fulfils the criteria of permanent use, Ulrik, Monica and Anne accept the recommendation. Environmental concerns are not addressed in the recommendation form nor are they otherwise discussed by the administrators.<sup>282</sup>

Environmental friendliness, then, is not supported by the legal rules for recommendations which emphasize the significance of functionality and price. Rather, the rules translate into a practice that solely concentrates on issues mentioned in the legal framework. The only criteria are the appropriate functionality of the device in relation to the needs of the client and the price of the product. Environmental friendliness is absent and thereby *blocked out of the product comparison by a recommendation application and related legislation*.

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<sup>279</sup> Interview with Lotte, nurse in county hospital C in the County of Arnæs October 17 2006.

<sup>280</sup> Administrators receive recommendations also from county hospitals, independent doctors and citizens. These recommendations are dealt with according to the same criteria as those coming from the municipal nurses (Interview with Ulrik, administrator in the municipality of Solbæk October 28 2006, interview with Monica, administrator in the municipality of Solbæk November 6 2006 and interview with Anne, administrator in the municipality of Solbæk November 15 2006).

<sup>281</sup> In order to get permanent financing for an assistive device, the end-user has to have a permanent physical disability the daily burdens of which are considered to be decreased by the use of the assistive devices (Socialministeriet 1988, 1998 and 2004). The principles of the financing and procurement have remained very much the same all through the 1990s and until now and were described in the Law on Social Support (Bistandsloven) up until 1998 and in the Law on Social Services from then on.

<sup>282</sup> Interview with Ulrik, administrator in the municipality of Solbæk October 28 2006, interview with Monica, administrator in the municipality of Solbæk November 6 2006 and interview with Anne, administrator in the municipality of Solbæk November 15 2006.

These, like the list of negotiated products, have become qualification devices that carry a successful script according to which their user ought to act (cf. Akrich 1992: 208).

### 6.2.6. Summing up

Some of my interview persons in the county hospitals and rehabilitation clinics link PVC and waste issues to the environmental concerns related to PVC. Also, waste is mentioned by four of my interview persons. However, only in very few occasions do these issues contribute to making a distinction between environmentally friendlier and harmful drainage bags. In the comparisons between different drainage bags, environmental friendliness is a quality that is not coordinated with other product qualities – apart from three occasions where the PVC-freeness of the chosen bag or reducing the amount of waste are seen as an added value to the choice of bags.

The calculative space for nurses treating patients with continence problems is to a great extent built around price, functionality and availability of products. The respective importance of these criteria varies from place to place. It is especially in two hospitals within the same county where two of my interview persons feel that their choice of bags is very limited. The devices that emphasize the weight of functionality, price and availability and contribute to the shape of the calculative space include the list of negotiated products, budgets, recommendation letter, legislation dealing with assistive devices and the Danish Standard – and the body to be treated or made independent of assistance. It is the patient's body, its dimensions, abilities, flexibility and coordination ability that provide a physical frame to the needed functionalities. However, also the patient's wishes and articulations of her lifestyle become defining for the appropriate level of functionality. Environmental friendliness is not enacted as a product quality present in this practice and in these devices; neither does it participate in qualifying the product.

On the other hand, environmental friendliness is hardly actively disregarded. It appears to be a non-quality when making a medical needs assessments; it is simply absent. I argue, that there are – at least – four issues that contribute to the absence of environmental friendliness as a product quality in the needs appraisals. Firstly,

urine bags are defined as insignificant in terms of their environmental impacts. Secondly, environmental friendliness is blocked out by not including environmentally friendly products on the list of negotiated products. Thirdly, environmental friendliness is expected to be a norm. Fourthly, the focus on health and price is further emphasized by importing the principles for permanent financing of assistive devices into the work of nurses by making them in charge of recommending particular types of products according to the principles enlisted in the social law and adjacent recommendation application forms.

## 6.3. End-users in the qualification of a urine bag

The two previous subchapters have dealt with how environmental friendliness has been integrated into needs appraisals for urine bags in hospitals, home nursing, care homes and centres for people with disabilities. One of the parties in these assessments is the end-user of the drainage bag who often participates in defining the qualities of the competing products and their preference order. Furthermore, end-users might participate in the needs assessments both in the municipal and the regional settings. In this chapter, I discuss how environmental friendliness is or is not included in the comparison carried out by the end-users alone or in cooperation with medical professionals and administrators in charge of the financing of the bag.

Einar, Mimmi and Leo all use wheel chairs. For Einar who is an elderly man, being paralyzed with a spinal cord injury is something relatively new: it only happened two years ago. Mimmi was involved in a car accident as a child and has been paralyzed for 21 years. Leo, a man in his late thirties, has got multiple sclerosis which took him to a wheel chair over a short period of time some ten years ago. My interview with him is really an interview with Leo's wife, Esther. Leo is no longer able to talk.<sup>283</sup>

Einar and Mimmi use Conveen Security+ leg bags and Leo Conveen Contoured leg bag and a standard night bag that have been recommended for them through

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<sup>283</sup> Interview with Einar June 13 2006, interview with Mimmi June 13 2006, and interview with Leo/Esther October 15 2006.

their municipality by a nurse at the special rehabilitation centres where they have received rehabilitation treatment and gone to regular check-ups. Einar and Mimmi have been treated in the centre where Hans, one of the nurses I have interviewed, works.<sup>284</sup> Leo has been treated in a rehabilitation centre, where another of my interview persons, Kira, a health care assistant, works.<sup>285</sup> In the following, I will discuss the process of choosing a particular bag for Einar, Mimmi and Leo and investigate how product qualities, including environmental friendliness are ordered in this process.

### 6.3.1. Ordering qualities

Mimmi has used a urine bag for close to twenty years. She started out with a rather small day bag that did not have a safe closing mechanism. While she received treatment at the clinic, she brought up her wish for getting a bigger bag with a safer closing mechanism. A larger volume would make it possible for her to move freely when in town, go out and participate in festivals and such. She tried several larger bags, but they proved to be too big. She is very happy with Conveen Security+.

Mimmi: "I had just a normal leg bag to start with. And then I wanted to find something that could hold a little bit more. And this one can, all the way up to 800 ml. There are not that many leg bags that can. At the same time I wanted it to be easy to open and close."<sup>286</sup> (translated from Danish by author)

Leo started using urine bags shortly after he fell ill with multiple sclerosis. At first the bags were attached to an urisheath (a condom catheter), later on to a permanent catheter. It was very hard for Leo to get a bag that functioned well.<sup>287</sup> The user inscribed (Akrich 1992, p. 208) in the bags given to Leo was in conflict with this particular user.

Esther: "We tried a whole lot of bags. It was a pure hell for us. Valve did not function. We'd have to attach the bag on the thigh because the

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<sup>284</sup> Interview with Einar June 13 2006 and interview with Mimmi June 13 2006.

<sup>285</sup> Interview with Leo/Esther October 15 2006.

<sup>286</sup> Interview with Mimmi June 13 2006.

<sup>287</sup> Interview with Leo/Esther October 15 2006.

inlet tube was too short which resulted in the bag popping up. Leo could walk a little bit at that time, and if he came to hit the bag a little, the closing mechanism would open and let the urine out making him not want to go out from home. He was afraid of an accident. It was not that much fun. But that was what was given to us [by the municipality].”<sup>288</sup> (translated from Danish by author)

It was only after Leo got a possibility to visit a sclerosis clinic that he received a better functioning urine bag and urisheath. The bag that he became introduced to, Conveen Contoured leg bag, is the bag he still uses today even though he has changed from an urisheath to a permanent catheter. During the night a larger night bag is attached to the day bag. The good functionality and safety in use has kept Leo attached to the bag.

Esther:”And then a bag whose tube you could cut and adjust in the length so that it could sit on the leg. And then it has also this non-woven material, there is a secure closing mechanism; it is dealt into chambers so that you do not hear noise when you walk. And we became really pleased with it.”<sup>289</sup> (translated from Danish by author)

Einar got introduced to urine bags two and a half years ago when he was in rehabilitation after he got paralyzed. When I ask Einar why it was exactly this bag that was recommended to him, he tells me that it was just given to him. Einar, however, is very happy with the bag and does not want to change to another bag.

Einar:”It is, it just fits my leg and everything. It is just excellent. I would not want to change to another bag.”<sup>290</sup> (translated from Danish by author)

The main focus of the end-users in choosing a bag is functionality. The appreciated functional features differ from user to user, but the main principles are that the bag ought to be secure and easy to use (by the end-user herself if possible) and it should not cause skin irritation. It should ideally allow for the life that the user wants to lead. The functional features of the bags are revealed partly in the practice

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<sup>288</sup> Interview with Leo/Esther October 15 2006.

<sup>289</sup> Interview with Leo/Esther October 15 2006.

<sup>290</sup> Interview with Einar June 13 2006.

of using the bag when the interface between the bag and the body is taken into different situations, ranging from rock festivals to a good night's sleep. Thus, it is not only in laboratory conditions and with the help of specific meteorological tools that the different features of the product are revealed in the course of the process of qualification-requalification. Everyday life can do the trick as well. For instance, the friction between Lars and the user inscribed in the bag in use conflict, the length of the tube or the durability of the foil of the bag becomes in a very concrete manner enacted for Lars – and his surroundings.

However, the features of the bags also emerge in consultation with nurses who recommend a particular bag for the end-users. The nurse's knowledge about the possible functional qualities and the availability of products with these qualities defines the range of possible alternatives to be tried and possibly clarifies and even adds more qualities to be considered by the end-user.

As shown by the case of Einar, the preference order of the end-user only participates in the qualifying of the bag as long as it is articulated to a medical professional. However, even when this does not happen, the end-user participates in making the qualifying order; this time as a body, as a person that the nurse includes in her assessment and uses as one of the grounds for her decision. Here, we can talk about a far more organized setting for revealing the product qualities.

Even though a specific functionality is enough for the end-user to qualify the bag, the attachment is not complete without the acceptance from the financing party, the municipality of residence of the end-user. In order to get the acceptance, the clinic recommended the new product to my interview persons' home municipalities. The order of qualities stabilized in the needs appraisal is not final. Einar does not mention that there would have been any problems in receiving the acceptance for using exactly the bag he was recommended to use at the rehabilitation clinic. However, the discussions around Leo's and Mimmi's present bag show a concern for economy in the municipalities where they live.

At the treating clinic, Leo was told that the price of the bag could become a ground for rejection. However, the recommendation was accepted even though the bag was much more expensive than the bag that originally was given to him from the centre for assistive technologies in their municipality. The person administrating the financing decisions, however, did recommend Leo not to change the bag every

day for financial reasons.<sup>291</sup> In Mimmi's case, the person responsible for making the financing decisions for the bags only agreed on financing the recommended bag to Mimmi, when she heard that she could use the bag for seven days at a time.<sup>292</sup> The bag that had been considered too expensive became now cheaper in the long run. Also Einar uses his bags for longer periods: he changes the bag once a week.<sup>293</sup>

Satu: "Did anybody recommend you another bag [than Conveen Security+]?"

Mimmi: "The ergotherapist, she recommends mostly the cheapest. But even though it was cheaper, that one would need to be changed every day, whereas that from Coloplast, it can be more expensive, but on the contrary I use it for a week at a time. So in the long run it has become cheaper. So when it was put that way, they could see it too."<sup>294</sup>

(translated from Danish by author)

Focusing on the total costs of use instead of the price per bag, changed the frame – and the result – of the calculation undertaken by the ergotherapist. This, indeed, was the same type of reframing of the calculative space as carried out by Marina, the health care assistant in a center for people with disabilities in the municipality of Solbæk, and marketing staff at Coloplast Denmark. Here, Mimmi and Leo are once again involved in establishing a qualifying order for drainage bags. When they agree on using the bag for several days, yet another feature for the bag emerges, namely acceptable price. This feature seals the qualification process. The bag can now be attached to the body of the end-user.

Environmental friendliness is not a product quality that any of the end-users I have interviewed considers when choosing a urine bag: none of them have thought about it in relation to urine bags before my interview. Environmental friendliness is not available in the information that the end-users receive on the products. Furthermore, environmental friendliness is not enacted as a product quality in the process of choosing the bag in consultation with the nurse.

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<sup>291</sup> Interview with Leo/Esther October 15 2006.

<sup>292</sup> Interview with Mimmi June 13 2006.

<sup>293</sup> Interview with Einar June 13 2006.

<sup>294</sup> Interview with Mimmi June 13 2006.

Satu: "Has there ever been discussion about the substances used in urine bags?"

Esther: "No, absolutely not. It was very much about the backside [soft back side of the urine bag]. Plus that have a bag that gets cold can make your spastic. And they focused a lot on that the bag would be isolated."<sup>295</sup> (translated from Danish by author)

The interaction between Einar, Mimmi, Leo, nurses, ergotherapists and financing administrators has got a particular focus: functionality and the price of the device. Environmental friendliness is not part of the assessment calculations, neither is its inclusion supported by anything in the calculative space and none of the end-users attempt to make it an issue. However, taking something, for example particular functionalities, into account, does not automatically lead to other concerns becoming suppressed. Thus, in the next part of this subchapter, I will discuss how environmental friendliness is kept out of the comparison of product qualities by end-users. I argue that at least two different issues make environmental friendliness stay outside of considerations: perceiving environmental friendliness as a norm and privileging of features relating to everyday functions.

### 6.3.2. Environmental friendliness as an expected norm

PVC is not something Esther considers in relation to urine bags. However, she is knowledgeable about the environmental and health related concerns related to PVC. When asked about PVC in relation to urine bags specifically, Esther tells me that she has not given PVC a thought as she has believed that it has been phased out from plastic products. This is her experience from other products, such as gloves at her working place.

Esher: "It is important with PVC and stuff. I have to admit that I have not even speculated on it because I actually thought that there was nothing like that in there. Because I think we have come more and more away from it. That is why I had not even thought in terms of different substances."<sup>296</sup> (translated from Danish by author)

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<sup>295</sup> Interview with Leo/Esther October 15 2006.

<sup>296</sup> Interview with Leo/Esther October 15 2006.



Esther disregards PVC-freeness as a product quality by *expecting it to be a norm*.

### 6.3.3. Environmental friendliness passively disregarded because of its distant relation to every day challenges

As for Mimmi and Einar, environmental friendliness as a product quality is neither privileged nor disregarded, it is *absent*. Neither Einar nor Mimmi know what the bags they use are made of, neither does this play a significant role to them.<sup>297</sup> Both of them are mostly interested in whether the drainage bag functions well.

Satu: "Would you be interested to know what the products are produced of, or?"

Mimmi: "No, I can see that it is good if it is good for the environment and such but I have not considered it."

Satu: "So the most important thing is that it works?"

Mimmi: "Yes, I'd say that. It has to work and it should be functional."<sup>298</sup> (translated from Danish by author)

Bags, in general, are not something Einar thinks about so much. For Einar, choosing a urine bag is only one of the great many issues to be organized and dealt with, thus it cannot be dealt with in a complex way. This is a further reason to delimit the issues taken into consideration in the qualification process.

Einar: "I do not know how much it matters if the bag is PVC-free. I have other things to think about than these bags."<sup>299</sup> (translated from Danish by author)

Esther strikes a similar note in relation to the long term health effects of PVC. For Esther, the possible health related effects of PVC are far too distant to think about when making decisions that need to make everyday life run smoothly. The focus is very much on the present and the functionality of the products Leo uses.

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<sup>297</sup> Interview with Einar June 13 2006 and interview with Mimmi June 13 2006.

<sup>298</sup> Interview with Mimmi June 13 2006.

<sup>299</sup> Interview with Einar June 13 2006.

Esther:”There is nothing that is for free when you are sick and choose a treatment. And that’s why I think we focus on functionality. So, if you get a hormonal dysfunction or die of cancer when you are 80 that I cannot relate to right now. Because I have to be able to function today.”<sup>300</sup> (translated from Danish by author)

The reactions from my three interview persons indicate that living with an illness and crafting a liveable every day life reduces the topics of concerns to those characteristics that can have a concrete, physical effect on the user’s life in the short term. Environment or health related aspects are disregarded from the qualification process by *privileging issues based on their vicinity to everyday functions*.

#### 6.3.4. Summing up

If end-users, Mimmi, Einar and Leo could decide upon the order of qualities sealing the qualification of their drainage bag this would be done based on functional qualities. The features of the bag emerge while using the bag, while becoming aware of its material dimensions and their effect, friction and celebration, on the user’s body and life. Furthermore, the functional features of the bags emerge in a possible consultation with nurses.

However, before the recommended bag is qualified, both Mimmi and Leo enter into negotiations with the financing party. In this interaction yet another quality of a bag emerges: price level. Qualification, therefore, proceeds as a process with different parties involved at different times.

Environmental friendliness is not part of the qualities that the end users pay attention to – and neither are they addressed in their encounters with nurses or municipal officers. Environmental friendliness is absent from the evolving calculative space for comparing products. My interview persons have not attempted to introduce environmental friendliness to this space where the qualification of the device is at stake. Therefore, based on my interviews, I argue that at least two issues participate in keeping environmental friendliness in any of

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<sup>300</sup> Interview with Leo/Esther October 15 2006.

its forms out of the end-users' attempts to form the qualification criteria. Firstly, environmental friendliness can be expected to have been stabilized in the previous trials of qualification, environmental friendliness can be expected to be a norm. A stronger – and maybe even related – reason for not considering environment seems to be the feeling of saturation by my interview persons. Making everyday-life as easy and enabling as possible gives very little room for other concerns, whether they are about the environment or even about health in the long term.

## 6.4. Conclusive summary

The aim of this chapter has been to inquire into the different forms that environmental friendliness is enacted in – if any. Furthermore, I have looked at how environmental friendliness is coordinated with other qualities and what kind of stability it has achieved in different parts of the procurement processes. In this conclusive summary, I wish to draw the reader's attention to three issues: the enactments and spatial distribution of environmental friendliness as a product quality, the relationship of environmental friendliness to other product qualities, and the compatibilities and conflicts between natural environment and other environments such as user, economic and health environment present in the use and procurement of urine bags.

As for its ingredients, environmental friendliness has proved to be a quality of variable geometry.<sup>301</sup> In different settings, at hospitals, in procurement offices, home nursing and care homes it is enacted in different ways. However, environmental friendliness is mostly equalled to PVC-freeness, although it can also take the form of waste reduction or non-allergenic substances. In the call for tenders, it appears as a manifold and detailed composite of many different product qualities, only to be simplified to one or two different composites, PVC-freeness and phthalates. However, when comparing the bags that have been tendered environmental friendliness is enacted as PVC-freeness and freeness from particular phthalates – a formulation of environmental friendliness that comes very close to the one in the public debate on urine bags. Further down the line, environmental

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<sup>301</sup> Both Callon (1991: 154) and Latour (1996: 24) address objects and actor with the notion of variable geometry referring to the multiple forms and versions they can take. Here, I extend this notion to one version of an object: environmental friendliness.

friendliness is sometimes understood as related to PVC-freeness, sometimes allergies or waste problems. No unitary understanding of greenness exists across the different settings. Furthermore, in many hospital departments, at home nursing visits and at the homes of the end-users, environmental friendliness is nowhere to be heard, seen or smelled. Environmental friendliness is a non-quality it is simply absent. Also, in settings where environmental friendliness might be acknowledged at a general level, it does not necessarily contribute to making a distinction between environmentally friendlier and harmful drainage bags.

Besides the fragility of the form of environmental friendliness, this chapter also reveals a somewhat restricted geography of the stabilization of environmental friendliness as a product quality in the successive parts of the procurement processes and the following needs appraisals. In the case of procurement of drainage bags, both discontinuities in time and space as well as in the participants to the procurement are eminent. In these discontinuities of the procurement process, environmental friendliness appears and disappears. Even though environmental friendliness is enacted and even stabilized to a certain extent in awarding a public procurement contract in the municipality of Solbæk and the county of Fredenshus, it does not follow that environmental friendliness would be enacted or enacted at all in the following parts of the procurement process. Also, it does not follow that environmental friendliness would be enacted in the same form as in the procurement agreement process. Furthermore, even though environmental friendliness is stabilized in the procurement agreement, it does not acquire the same grade of stability in the needs appraisals if enacted at all.

What, then, happens to the stability of environmental friendliness when and if compared and coordinated with other product qualities? Often, environmental friendliness, what ever its form, ceases to achieve the robustness that would make it one of the decisive qualities in the process where drainage bags are chosen and procured. The order of preferred qualities prioritizes functional properties and price over any other quality. The process of re-qualification has become routinized to the extent where new types of qualities that fall outside of functionality and price are hard, although not impossible, to take into account.<sup>302</sup> On some occasions, environmental friendliness is allowed to co-exist with functional qualities and price

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<sup>302</sup> Callon et al. (2002) describe an attached consumer as being caught up in routines leading them to choose the same product over and over again (Callon et al. 2002: 206). Here the point is similar, yet different. Nurses and procurers hesitate, they re-qualify. However, this happens within the same generic qualities of functionality and price.

requirements, and on some, although very few, occasions it can even be prioritized over price. Privileging just like co-existence is, however, always conditioned to either a particular level of functionality and price, or functionality alone. Environmental friendliness, when stabilized in the product comparison, is always a dependent quality.

Privileging environmental friendliness comes in two forms: *privileging over price up to a certain price level or within a certain subcategory* of buyers and *privileging over other product qualities in case the assortment does not include any other PVC-free products*. Besides privileging and enabling co-existence, environmental friendliness is related to other product qualities as *enhancing the value of other product qualities*. Privileging only happens in the procurement agreement processes in the municipality of Solbæk and in the county of Arnæs.

The restricted geography and the weakness of environmental friendliness in comparisons with other product qualities outside of the procurement process are not altogether surprising. In the case of the practices discussed in this chapter, I argue that at least eight different issues have contributed to the absence and instability of environmental friendliness in the comparison with other product qualities – though not necessarily all simultaneously. These are as follows:

- Environmental friendliness expected as a norm that has already been stabilized
- Significance of the source of environmental impacts questioned altogether
- Environmental friendliness disregarded as being more significant for another product group which is responsible for a greater share of the totality of emissions
- Environmental friendliness as a product quality juxtaposed with the most stabilized quality, functionality, when the economic room for mobility is tight
- Environmental friendliness delegated to the periphery by living up to legislation that restricts the significant qualities to price and functionality
- Environmental friendliness delegated to the periphery by suggesting tenders on particular products rather than on generic products
- Environmental friendliness as a materialized option ruled out by the previous decisions and practices in the procurement process, i.e. absence of PVC-free

products in the tenders and successive absence of PVC-free products in the list of negotiated products in the county of Fredenshus

- Feeling of saturation by end-users leaving very little room for other concerns than those related to every day life

Some of the above mentioned issues relate to a direct questioning of the environmental significance of the product. However, most of all, the focus is effectively led by and restricted to other qualities, particularly to functionality and price. This delegating of environmental friendliness to the periphery or even into absence follows, at least partly, from the way the calculative space around procuring and choosing a urine bag is constructed and kept coherent. This space takes shape as several interlinked and interdependent calculative spaces get intertwined with each other. The procurement agreement is dependent on user needs, yet it simultaneously restricts the possibilities to unfold these. Needs assessments feed into product specifications in the procurement process, yet it has to follow the procurement agreement – and fulfil the requirements for a legally valid recommendation for assistive devices. In these different settings, actors are exposed to multiple possible orders for qualification of a product. Indeed, they find themselves in a multivalent calculative space where different logics of calculation interfere with each other (cf. Law and Akrich 1992: 211).

This multivalence and interconnectedness of calculative spaces, I argue, puts great focus on the ways in which the process is kept from falling apart. Between these different settings where qualification work is conducted, a range of different devices circulate.<sup>303</sup> These devices, as we have seen, enact functionality and price as the predominant qualifying features. The principles of lowest price and relevant functionality are embodied and transformed into non-negotiable devices, such as budgets, product lists, bodies requiring assistance and recommendation sheets. Together this chain of devices configures a group of interlinked calculative spaces where product requirements are homogenized despite of discontinuities in the group of participants and dislocations in terms of place and time. These devices solidify the calculative spaces that qualify and re-qualify primarily on the combination of price and functionality.

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<sup>303</sup> These devices could very well be called boundary objects circulating between different worlds (Star and Griesemer 1989: 408-11). Here, in addition to Star and Griesemer's understanding, the worlds, however, are not only seen as consisting of humans, being social in this sense, but also encompassing non-humans as active actors.

Unlike environmental friendliness, price and functionality, then, travel from setting to setting while sustaining their significance. Apart from a few exceptions, environmental friendliness does not appear in classifications, information or recommendation sheets that are used to keep the procurement process coherent. This absence might not explain in total why environmental friendliness does not become important in the decision making process. It is, however, not only a sign of a particular stabilized preference constellation, but also constitutive for it. Without durable forms it is not possible to take environmental friendliness into consideration in a complex decision-making process. This observation could be seen as an example of Latour's argument that it is precisely the non-humans that bring the network its durability and enable it to work from a distance (Latour 1996: 19, Latour 2005).





# 7. DISCUSSION AND CONCLUSION

This dissertation has been a journey in and across those locations where natural environment related qualities of a product group, urine bags, are negotiated. The work of qualification of urine bags has been followed in product development, marketing, procurement and use – as well as in other practices where the environmental friendliness of the product has been at stake. In the first chapter of this book, I formulated my research question as follows:

How is environmental friendliness stabilized and destabilized as a product quality among the market actors?

My aim was to increase understanding of the role environmental friendliness as a product quality plays in construction of markets for urine bags and, furthermore, how it comes to obtain this particular role. Also, my research question was motivated by a wish to contribute to the literature dealing with the interface between natural environment and business. In the introductory chapter of this thesis, I indicated that the dissertation would contribute to the greening of business literature in four different ways: 1) by providing a longitudinal in-depth case study on greening of business, 2) by highlighting the roles of and interlinkages between different market actors in the greening process, and 3) by investigating the process of greening from a new analytical perspective by placing the product in the centre, and 4) by building upon a constructivist conceptualization of market processes in the field of greening of business research.

In order to answer my research question I investigated practices where qualification work took place. In addition, I looked into processes that had a potential to influence the qualification work in other settings. My three empirically based chapters dealt with initiatives and debates on environmental concerns related to urine bags taking place in the public arena, in the development and production

of an environmentally friendlier urine bag and in the procurement and use of urine bags. Below, I briefly present the conclusions from the analysis and discuss these findings in the light of the contributions to the literature in the fields of business and natural environment. After presenting my findings I will discuss the significance of the interference of practices with each other for the process of qualification-re-qualification of a product and for the role that environmental friendliness assumed in this process. Finally, I broaden up the discussion by highlighting some lessons that the dissertation at hand can teach us about urine bags as political technologies for the natural environment.

## 7.1. Conclusions

In chapter 4, I looked into how environmental friendliness of urine bags was approached in the public sphere. It was shown that if and when the environmental qualities of urine bags were discussed, they were related to the material the bags were made of, PVC. In the public arena, the environmental impacts of PVC were enacted with the help of various scientific inquiries in relation to dioxin, phthalates, heavy metals and acid flue gas emissions. These impacts were often contested.

In the late 1980s, substitution of PVC was identified as the key to environmental friendliness in the product group of urine bags. Attempts to phase out PVC taking place in the public arena, however, went well beyond the product category of urine bags. Substituting PVC by mandatory law or a voluntary agreement would have stabilized environmental friendliness as a product quality in a form of PVC-freeness. This stabilization might have worked – at least to the extent that the firms would have obeyed the law or the agreement – as a prequalification criterion for the Danish products in the market: a product quality of PVC-freeness would have been needed in order for the bag to qualify to enter the exchange relation between the buyer and the seller.

Besides substitution attempts, PVC became the subject of several reframing efforts in order to make it an environmentally neutral material by containing the environmental overflows that had been connected to it. PVC recycling and recovery projects, to name the most prominent, attempted to reframe PVC as an

environmentally friendly or at least neutral material. If successful, they would have stabilized environmental friendliness as a product quality of PVC and thereby also of products made from PVC. These reframings, however, were not able to effectively contain all the environmental concerns that emerged in relation to PVC.

Neither the substitution nor the reframing efforts bore fruit in terms of outright stabilizing the environmental friendliness of urine bags either as PVC-freeness or as PVC being environmentally neutral. Today it is still possible to use PVC in urine bags despite of the environmental concerns related to this material. The process of framing and reframing of PVC has, however, brought about a constant movement between problematization and possible deproblematization of PVC in the public arena. The situation around PVC-use has not cooled down, but rather moved between cooler and warm, at times even hot (Callon 1998a: 260-61), as the environmental problems related to PVC have become translated, have transformed and travelled in interaction with new technical solutions to problems, scientific results and politics.

The initiatives conducted in the public arena show the contested and negotiated nature of environmental problems. There are both scientific controversies about the nature and very existence of the environmental problems and their relation to PVC. Furthermore, this case shows that also the solutions to environmental problems emerge and decline in hybrid political networks amongst parties with different emerging interests. For example, solutions such as PVC recycling orders and technology projects for PVC recovery have come about as a response of the industry to the governmental plans on PVC substitution. Different solutions, in their turn, influence what is and what is not seen as problematic. Addressing environmental friendliness and solutions to environmental problems as entities under negotiation is a consideration that is mostly absent from the greening of business literature. In this body of literature the emergence of the product related environmental concerns is seldom discussed. Here it should be pointed out that taking the negotiation and fluctuation of the problem into account might profoundly influence the ways and strategies of greening both on the producer and the user side.

Another point I wish to make relates to the role played by firms and their trade organizations in the process of construction of particular environmental problems and their solutions. The greening of business literature points to the possibility and

even moral obligation of business to bring about technical solutions to environmental problems through corporate environmental strategies. In this literature, the form a corporate environmental strategy takes is often seen as influenced by a number of external and internal factors. The role played by the greening of the firm or industry in constructing the environmental problem or its solution in relation to other actors is, however, seldomly discussed in depth (for examples of the latter see i.e. Child and Tsai 2005, Hoffman 1999, Orsato et al. 2002). In the case at hand, business life has participated both in defining the environmental problems and their solutions. Indeed, to use ANT-terminology, what we see in this case is a perfect illustration of distributed agency at work (Callon 1984, Callon and Muniesa 2005, Garud and Karnøe 2001).

On a similar note, in the greening of business literature, firms are often seen as passive objects for environmental regulation. While I, based on this case, have no doubt that regulation attempts can influence the innovations and greening strategies of the firm, I also wish to give my support to scholars (i.e. Buysse and Verbeke 2003, Child and Tsai 2005, Hart 1995, Hoffman 1999, Orsato et al. 2002, Puller 2006, Shrivastava 1995a, Shrivastava 1995b) advocating that this relationship might be reciprocal. The Danish business life has by no means been a passive actor in relation to regulation attempts in the field of PVC. Rather, it has actively presented overflows in the plans to substitute PVC. Furthermore, it has provided alternative solutions to the reconciliation of concerns related to this material. Thereby, the industry has been able to influence both the enactment of PVC as problematic and the ways the problems related to this material have been dealt with.

Chapter 5 dealt with product development and marketing of a PVC-free drainage bag. Environmental friendliness was again enacted in relation to the product materials which led to the materialization of a drainage bag made from non-PVC materials. This chapter discussed the different modalities of stabilizing and destabilizing environmental friendliness as PVC-freeness in the course of product development and marketing. During the product development, PVC-free materials proved to be incompatible with some of the other product qualities such as kink-freeness of the tube, security in use and discretion. It was, however, possible for the product developers to find ways of making environmental friendliness compatible with other attempted product qualities. On many occasions, the coordination (Mol 2002: 55) and choosing between environmental friendliness and

other product qualities was avoided by either making compromises and adjustments in other product dimensions, separation of the incompatible product features from each other or by postponing the coordination. Sometimes PVC-freeness was also privileged over other product qualities in order to make the existence of a PVC-free product possible. In marketing, environmental friendliness was existing but PVC-freeness was toned down in the written marketing materials and later on also by sales consultants in relation to other claimed benefits. This toning down was an outcome of negotiations between PVC-freeness, the producer's PVC-products and the users' willingness to pay. The stability of environmental friendliness is not sealed even though the product has been manufactured from particular materials – the product might cease to be articulated as environmentally friendly at any time.

Again, there are contributions to be made in relation to the literature on business and natural environment. In the greening of business literature, the character of environmental friendliness of a product is not a topic of discussion: products either are or are not environmentally friendly. Here, the constructed quality of environmental friendliness becomes visible to the readers. Environmental friendliness in relation to urine bags is enacted as PVC-free, its form is thus not something given. This also means that the product can be stripped of its PVC-freeness or environmental friendliness. Both of these qualities are at stake during the product development and in the marketing and interaction with the buyers. The case of Conveen Security+ drainage bag nicely confirms a point made by Callon et al. (2002): the qualities of the drainage bag are produced in interaction between the producer, the buyer and a number of other actors (cf. Callon et al. 2002: 198-202).

A second point relates to the way the environmental strategies of enterprises are discussed in the greening of business literature. Using a well established term, Coloplast's environmental strategy could be characterized as product stewardship (Hart 1995: 992). In the greening of business literature, the environmental strategies of the firm are often portrayed as encompassing different alternative strategies (i.e. Hart 1995, Winn and Angell 2000, Buysse and Verbeke 2003). However, the greening of business literature does not investigate in depth how any other type of strategy is formulated or implemented. I see this chapter as an important contribution to this body of literature as it presents a detailed account and an analysis of the work required for an environmental product to come into

being and environmental friendliness to be integrated in the product related market strategy of the firm.

This investigation reveals the strategy process as something more subtle and explorative than what is indicated by the greening of business literature. First of all, in the beginning, the green bag project was a product development project, not a strategy for the whole company. Gradually, PVC-freeness and phthalate-freeness have achieved stability in the company and today participate in the defining principles for product assortment development. However, product stewardship strategy does still not apply to all the products that are produced or sold by the company. Furthermore, the story of the development and marketing of Conveen Security+ reveals a product strategy in the making: a lot of work, juggling with product dimensions and materials, privileging of some product qualities over others and compromises are needed in order for the green product to come into being and for the strategy to gradually take form. The emerging strategy is contested by non-compliant materials and other visions of competitiveness. Upon test-marketing and launch, the strategy-in-the-making gets reformulated: the PVC-freeness of the Conveen Security+ urine bag is downplayed as a marketing claim in test-marketing and marketing in some countries. This is done in order not to risk the competitive advantage of the total product portfolio. The green strategy of the firm should not be taken for granted, even once adopted.

A third point of contribution relates to the concept of product differentiation. The green marketing literature suggests that in case of green products, the competitive advantage of the product can be realized through green product differentiation followed by a green price premium or taking over a specific consumer segment (Reinhardt 1998: 46, Shrivastava 1995a: 195, 198, 1995b: 955, Banerjee et. al. 2003: 109). Greening the business literature addresses some issues that might affect the benefits of green product differentiation strategy in marketing. These include customer willingness to pay (i.e. Laroche et al. 2001, Reinhardt 1998: 52, Wong et al. 1996), difficulties related to segmentation (i.e. Roberts 1996, Straughan and Roberts 1999, Schlegelmich et al. 1996) and finding appropriate marketing tools and arguments for the green products, to name some (i.e. Davis 1993, Meyer 2001, Peattie and Crane 2005, Polonsky and Rosenberger 2001). While this case confirms that customers influence the product differentiation attempts, an empirical observation reveals another problem related to whether a company opts for differentiating its product based on environmental friendliness.

The product differentiation strategy of a company might be influenced by strategic considerations related to the total product assortment within the producer company. In this case, PVC-freeness of the urine bag is seen as a potential threat to products made of PVC, such as colostomy bags which leads to considerations about the viability of a green product differentiation. If we wish to understand the way enterprises market their greener products, then the internal issues of the firm also need to be taken into account.

Chapter 6 highlighted the complexity of the buyer side for urine bags. In this case, environmental friendliness as a product quality was shown to be a fragile quality that became enacted in different ways and in different strengths in different locations – and in some locations not at all. The buyer side featured a number of discontinuities in time, space and participants to the procurement process. Amidst these discontinuations also environmental friendliness in its various forms appeared and disappeared. An issue clearly visible in procurement and use was the intertwining of environmental and health related concerns related to urine bags. This is an issue that could also be observed in the product development, marketing and the public arena.

When enacted as a product quality, environmental friendliness was always dependent on other product qualities, mainly price and functionality. Privileging of environmental friendliness, however dependent, came in two forms: privileging over price up to a certain price level or within a certain subcategory of buyers and privileging over other product qualities in case the assortment does not include any other PVC-free products. Besides privileging and enabling co-existence, environmental friendliness was related to other product qualities as enhancing the value of other product qualities.

On those occasions where environmental friendliness was either directly disregarded or, alternatively, absent on its own right, I suggested that several different issues had contributed to this. Some of these issues were linked to a direct destabilizing of the relative significance of environmental friendliness in the product group in general or questioning of the absolute environmental impacts of the product material. In addition environmental friendliness as a matter of concern was also effectively delegated to the periphery by a restrictive focus on other qualities. This development was facilitated, I argued, by an evolvement of particular types of calculative spaces consisting of chains of calculative devices

such as budgets, data sheets and so forth transporting the priorities of low price and appropriate functionality from location to location and practice to practice.

The contributions from this chapter to the business and environment literature are many. In the greening of business literature, the environmental friendliness of a product is mainly portrayed as a stable quality in which the customers are either interested or not. This chapter shows that not only can environmental friendliness as a product quality be approached as enacted but also that a unitary enactment of environmental friendliness across different settings cannot be taken for granted. PVC-freeness, for example, is equaled to environmental friendliness by some of my interview persons while others question its absolute or relative environmental impacts in regard to urine bags. Rather than seeing environmental friendliness as a stable entity, we might instead gain from focusing on its constructed character and the resulting multiplicity of this product quality (cf. Mol 2002).

The consumer side focus in the greening of business literature is on private consumers. This chapter deals with organizational consumers in the form of organizational buyers and users. To be more exact, the consumers in this study are hybrids of private and organizational, private and public actors. As organizations, both public and private and combinations of these, consume a significant part of products produced today, the understanding of product markets cannot be restricted to private consumer markets only. One of the main contributions of this chapter to the greening of business literature, then, is the knowledge constructed about organizational consumers which until now has only rarely been covered in this body of literature.

The definition of the green consumer has been one of the major topics of discussion in the green consumer literature. In relation to organizational buyers, techniques such as segmentation of consumers (see i.e. Roberts 1996, Straughan and Roberts 1999, Schlegelmich et al. 1996) seem rather inadequate. In this case, the buyer is a constellation of multiple interdependent actors active in several different settings in which the enactments of environmental friendliness can vary from PVC-freeness to waste reduction to being a non-issue. Thus, placing the organization in one segment becomes difficult. Rather, I support those scholars who have advocated the significance of better understanding the different procurement situations rather than emphasizing the socio-demographics of the buyer. Here the socio-demographics of organizations could be seen as age, size,



business area, environmental policy and so forth. In this chapter, an investigation of different practices involved in conducting procurement has made a difference in terms of understanding the modalities and ways of integrating or removing environmental friendliness from the group of stabilized product qualities, even in case of organizations with similar tasks and positions. However, this case suggests that a mere cost-benefit based situationalist approach might not work as an explanation to the differing procurement and use decisions either. The environmental friendliness of a particular product might not even be subject to any concerns what so ever or might, for other reasons, not even enter into a rational calculation of cost assessment.

To turn the case upside-down, looking at the procurement and use of urine bags has also provided an interesting case about the practices of integrating environmental concerns into the procurement and use in a public service organization rather than a producer enterprise. The devotedness of the actors in the studied organizations to cost reduction and separation of the "core" product related issues, namely functionality, from wider issues of environmental responsibility is striking. The organizations were geared materially and discursively to provide health care services within particular budgetary limits. Natural environmental concerns were not enacted as the primary organizing principle of the public organizations at hand and were often delegated to the background by the chains of devices and humans focusing on health care related functionality and economic viability. Thus, the public good of environment to a great extent resides beyond the organizational borders of public organizations. This leads me to tentatively suggest that even though the public organizations, at least in idealistic terms, are established to guard the public goods, in terms of the natural environment they might not after all differ so much from private enterprises. Furthermore, going green might even fall easier for businesses if this can be anticipated to create extra revenues from customers. For public organizations, at least in this case, no extra financing is available to cover the possible rising costs of purchasing environmentally friendlier products.

In general, my studies in the public service organizations support the point already made in regard to greening of an organization in chapter 5. Greening an organization is definitely not only about making a strategic choice and proceeding linearly towards the obtainment of the set goals. Rather, greening involves heavy and continuous work and integrating environmental concerns into already complex

and multivalent calculative spaces in a process where the fate of the environmental orientation of the organization can be called into question at any point in time.

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With the given focus on environmental friendliness as a product quality, no unitary market construction can be seen in the markets for urine bags. Environmental friendliness is enacted in different versions in different locations and practices. PVC-freeness seems to be the widest spread version of environmental friendliness, partly because it is backed up by extensive scientific and technological work. However, environmental concerns are also absent from many market constitutive practices. Furthermore, even in those practices and by those market actors who do pay attention to the natural environment, environmental friendliness appears as a fragile quality that is often delegated to aside as other qualities become more significant for qualifying a product. In terms of environmental friendliness, then, markets for urine bags appear as variable and fragmented.

In the case at hand, the construction of markets for drainage bags happens in an interplay between several different actors: buyers, professional users, end users, producers, politicians passing laws on financing of assistive devices and allocating finances to hospitals and municipal organizations. The practices of different market actors influence each other and contribute to the qualities which the product assumes in the course of the process of qualification. These market actors are neither inherently green nor inherently ignorant of the natural environment. Rather, if and when they acquire more or less environmentally friendly characters this happens as an outcome of processes where they become equipped with environmentally friendlier products and modes of articulating the environmental qualities of these products. Furthermore, they are capable of reflection, visioning alternative realities and reformulating their strategies and aligning environmental friendliness with their other goals.

In each single event that participates in the qualification of a product, the markets are potentially subject to renegotiation. Changes in the principles of product qualification reformat the markets to a greater or lesser extent. However, attempts to change the order and relational significance between different product qualities by introducing environmental friendliness fail more often than they succeed. Investigations on the work of qualification carried out in different locations and practices reveals a number of highly stable actor constellations related to all the

different types of market constitutive practices. These actor constellations consist of devices, policies, humans – they are hybrid networks where agency is distributed – and qualify predominantly on price and functionality. Often, if environmental friendliness acquires stability in the process of qualification, this is achieved by making it alignable with other product qualities or vice versa. Most notably, environmental friendliness is dependent on particular price or functionality that are also outcomes of negotiation. The appropriate levels of functionality and price might very well differ drastically from location to location, yet it is only seldom that they are not settled prior to the environmental considerations.

## 7.2. Interferences

The greening of business literature does not usually investigate how different market constitutive practices interact, although it is widely acknowledged that different actors might influence each other. For instance, the innovativeness of the firm might be influenced by regulation (i.e. Porter and van der Linde 1995) and the customer willingness to buy green might be influenced by the type of marketing claims that the supplier relies upon (i.e. Davis 1993, Sammer and Wüstenhagen 2006). Based on the case at hand, some contributions regarding the interconnectedness between different market actors can be outlined. I argue that the process of market construction cannot be understood without understanding the evolvement of the relationships between actors over time. Furthermore, the complexity and emergent nature of actor constellations or networks makes it fruitless to draw simplified conclusions such as "enforcement of environmental regulations reduces innovativeness of the firms".

The case shows several interlinkages between different practices in different locations of production, use and public debate. In chapter 6, for example, I argued that delegating environmental friendliness to the periphery or even into absence on the user side followed, at least partly, from the ways and devices by which different calculative spaces and practices in the procurement and on the user side were linked to each other. Furthermore, there were interlinkages between marketing practices and procurement practices, marketing and use, between initiatives in the public arena and product development as well as procurement and

so forth, all influencing each other. And just as well, there were distributed and peaceful co-existence of different practices and thereby different ways of enacting environmental friendliness and different ways of weighing it in relation to other product qualities. In the following, I wish to explore how different practices come to interfere (Moser forthcoming, Mol 2002) with each other and thereby influence the process of qualification-re-qualification of a product and the construction of markets.

How does the interference of practices influence the enactment of environmental friendliness as a product quality in different locations? Take PVC-freeness, for instance. It is not a happy coincidence that environmental friendliness is enacted as PVC-freeness in the public arena, Coloplast and the procurement processes in the counties of Arnæs and Fredenshus and the municipality of Solbæk. I argue that this similarity in enactments is, at least partly, an outcome of interference of practices.

As we have seen, the green urine bag project carried out in Coloplast was connected to the PVC problematization efforts in the public arena in various different ways. One of these ways was making Coloplast's project part of the governmental effort with the public driven PVC-programme of action by financing, reporting obligations, evaluations, publicity and so forth. Here, the reciprocity of interference is important. Both practices interfered with one another leading to changes or mutual adjustments, to use the words of Callon and Muniesa (Callon and Muniesa 2005: 1233). Just as the governmental programme and financing became part of the constitution of a green bag project in Coloplast, the inclusion of the Coloplast project strengthened the PVC-programme of action by spreading it out on yet another area of substitution. Accordingly, the enactment of PVC-freeness as environmental friendliness was strengthened in both localities. The environmental assessments on alternative urine bag materials, for example, participated in enacting PVC as the foe and constituted a possibility to choose from better (in environmental terms) alternative materials both in and outside of Coloplast. Here, the interference took a form of *co-constitution* of a particular version of environmental friendliness.

Another example of interference of practices strengthening particular enactments of environmental friendliness is the work carried out by a working group for hospital procurement staff in the counties (SINERFA) and the trade organization for the Danish medical devices industry in cooperation with each other. This

cooperation resulted in the SINERFA data sheet that merged different practices in requesting and providing data. The data sheet allows for homogenous practices in different locations in terms of enacting environmental friendliness or harmfulness of medical devices. Here, the interference took a form of *mediation between practices* (cf. Sjögren 2006: 166).<sup>304</sup> As for now, the resulting composite of enactments of environmentally problematic issues circulates within different parties of selling and buying and might affect the local sales and even production practices. Here, interference is obtained *through performative devices*. These devices might shape practices in different locations by suggesting a focus on particular issues.

In the above mentioned interferences, not only the alignment of different enactments of environmental friendliness across different settings is at stake. In addition, also the strength of environmental friendliness in the practice of procurement, regulative work and product development is influenced by interfering practices. For instance, the cooperation between the PVC-programme of action and Coloplast initially strengthened the role of PVC-freeness in product development and national politics. However, in order to acquire strength the enactment of environmental friendliness was also dependent on other practices than those primarily dealing with environmental friendliness. The interference of the industry's competitiveness calculations in the settings where PVC-substitution was debated quickly made PVC-freeness a fragile quality. These competitiveness calculations were based on competitiveness by price rather than on environmental friendliness, an alternative vision for competitiveness fostered by Coloplast some years earlier.

A similar observation can be made on the procurement and user side where environmental friendliness is indeed delegated to a minor role in the procurement and needs appraisals. This order between environmental friendliness and price and functionality in particular is influenced by a chain of devices that homogenizes the principles of coordination between different product qualities across different locations and practices. On the buyer side, the work of interference between different practices is often carried out by devices that transmit the priorities in

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<sup>304</sup> Sjögren (2006) uses the concept of mediating to refer to particular kinds of efforts to handle ambiguity between different sources of knowledge in order to enable knowledge based decision-making (Sjögren 2006: 166). Here, the aim is not only to overcome ambiguity in decision-making, but also to spread the same enactment of environmental friendliness across different locations in order to make the work of qualifying more streamlined and therefore effective for both buyers and sellers.

product development from one location to another. There are budgets, product lists articulating functional qualities and price, recommendation sheets and so forth. Sometimes lists of negotiated products make it practically impossible to pay attention to some enactments of environmental friendliness. In some cases, for example, no PVC-free products are included in the lists. Here, the interference between different practices in different locations does not make the role of environmental friendliness stronger in the practice that is interfered in – quite the opposite. The delegation of environmental friendliness to the periphery, it seems, has been the case all the way along – although some exceptions to the rule do exist. In the interface between procurement and marketing, this weighing furthermore came to interfere in and influence the weighting PVC-freeness acquired in the marketing of the PVC-free urine bag in Coloplast.

The above mentioned events are just some examples of different modalities of interference. Other ways can, undoubtedly, be encountered even in the case presented in this dissertation. Common to the interferences described above was the significant role played by non-human actors. Indeed, non-human actors conduct work of interference. The above described interference of practices between the green bag project at Coloplast and the PVC-programme of action was enabled by streams of finance moving from one location to another, telephone calls, project plans, project reports, laboratory results and so forth. For example, the environmental impact assessments carried out by the Danish Technology Institute in cooperation with Coloplast within the above mentioned cooperation project were, also, one form of interference carried out by technologies as well. Here, an assessment technology that had already been used in the construction of the environmental impacts of PVC was transported to the cooperation project that was linked to the development of the green bag.

Non-human actors can make practices interfere with each other but so can people. Often the interference is carried out by non-humans and humans in cooperation. To continue with the same example, in the case of inclusion of the green bag project in the PVC-programme of action and vice versa, the work of interference was actually carried out by moving both technologies and humans, often in combinations, from one location to another. One example is Mathilde, who after having been employed by the Danish Technology Institute started as a product development engineer at Coloplast where she launched a cooperation project in cooperation with her previous working place and the public financiers.

## 7.3. Urine bag as a political technology

Throughout this book, I have been careful to respect the ways in which the actors enact environmental friendliness and how they relate it to other product qualities or matters of concern. In this final part of the final chapter, I will, however, move a step back and take a stand point. Let me start this way: a urine bag is a political technology (Law and Mol forthcoming).<sup>305</sup> By calling it a political technology, I refer to its ability to divide, to unite, to change the world.

One type of political work a urine bag carries out is making a person suffering from incontinence a part of the world where the smell or outbursts of urine create a social barrier as impenetrable as the Great Wall of China. What Jensen (2007) has written about colostomy bags also applies here: urine bags enable people with severe incontinence to act normal (cf. Jensen 2007, p. 20). If the bag is designed in the right way, it might also make its user with disabilities an independent person who can lead a life without constant human assistance for emptying the bag.<sup>306</sup> With the help of its qualities and a particular type of user, a urine bag can enact certain user environments: an odour-free environment, or maybe an environment where its user with poor hand dexterity does not need assistance from home nurses every time she wants to empty her bag.

Making a person suffering from incontinence part of the smell- and accident-free world and making people with disabilities independent actors (at least independent of human assistance) is work of a political kind. If an object like a urine bag can acquire a quality of environmental friendliness it also carries out another kind of political work: it makes care and the independency of a user harmless for the environment. It enacts a clean, non-toxic natural environment and thereby an ecologically sustainable production and consumption of urine bags. Indeed, a urine bag can become an environmental political technology. The next question I would like to ask follows from this: what has this case taught us about urine bags as political technologies for the natural environment?

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<sup>305</sup> This line of argumentation follows Law and Mol (forthcoming) on boiling pig swill, which they termed a political technology. The only difference is the use of technology instead of technique.

<sup>306</sup> The role of assistive devices in formation of contemporary subjectivities is also discussed by Moser and Law (1999).

As suggested above, a urine bag can include particular kinds of user environments and a clean, non-toxic natural environment. However, also other environments can be enacted or included in a urine bag. In the product development process at hand, for example, different versions of a business environment become inscribed (Akrich 1992: 208) in the "green" bag. Simultaneously, also the user- and the natural environments became endogenized in the very same device. To learn something about a urine bag as a political technology for the natural environment is to learn how these different environments are brought into being in different practices and how the relationships between them are negotiated and renegotiated as the bag travels from one location to another.

So, let us take a look at how the environments included in the urine bags have evolved and have been negotiated with each other during the timeframe of this case. During the product development, different types of environments are inscribed and endogenized in the product: a non-toxic natural environment, different versions of business environments and a particular type of user environment. In the course of product development and marketing, these environments and their relationship to each other change. For instance, in the project proposal, the relationship between a favorable business environment and a non-toxic natural environment starts off by being mutually enhancing. As the framing of the business environment changes from being favorable to environmental friendliness to environmental friendliness posing a threat to the overall competitiveness of the firm, these environments become almost opposite to each other. Later on, the business and the natural environment become possibly compatible again. This change in the relationships between the business and the natural environments influences the form in which environmental friendliness as a product quality gets enacted in the materiality and discursive articulations of the product.

During the product development, the product acquires a material form as PVC-free, yet its PVC-freeness is contested upon test marketing and toned down in marketing materials. However, it also goes the other way around: the material qualities of the product might affect the environments that are inscribed in the product. For example, a good user environment is challenged by the material inscription of the aspiration to a non-toxic natural environment. During product development, leakages and kinks appear, yet the two environments can be made compatible through juggling of dimensions of product components and materials.



On the other hand, by using non-PVC materials without phthalates, both a non-toxic natural environment and a non-toxic user environment can be obtained simultaneously. There is both friction and alignment between the attempts to envision these different environments and to inscribe them in the drainage bag.

Upon launch, these environments that are more or less steadily inscribed in the qualities of the bag are put on trial. Can they sustain in other locations or do they become de-scribed (Akrich 1992: 207) as something different? As the bag arrives to the Danish market, it is challenged by a set of rather different environments already inscribed in the procurement and care practices of hospitals and home care. The clean, non-toxic environment advocated by the new bag finds allies, but mostly it is confronted by the different environments already being enacted in the places of procurement and use.

Two issues become crucial here: the local economic and the user environments. Firstly, the user environment inscribed in the functionalities of the bag is confronted with the multiple user environments in the daily practices of health care. The openness of the health care professionals to the new bag is very much dependent on what the newcomer can contribute with in relation to these environments. Sometimes it does the wrong thing; the user of the bag remains the same user, lying in bed, not able to rise on her feet or to empty the bag herself. Rather, the bag becomes incompatible with the user environment that can be enacted with the help of other bags, larger bags which the nurse does not need to change all the time as they can contain four times more urine. Sometimes it also does something to the user environment that no other bag can do. The user suddenly becomes enabled by the bag to live independently of continuous human assistance. She does not get marks from the bag with the soft back side. The bag proves to be compatible with some user environments and it changes other user environments in previously impossible ways. What environments can be enacted are thus not only dependent on the bag, but also the user, and more specifically on the body and the mind of the user. For sometimes the user does not understand how to operate the bag even though she can operate the out-let valve.

It would be wrong to assess the ability of this particular bag in carrying out its environmental political work as a failure as it cannot comply with all of the above mentioned different user environments. What I wish to point out here is the limitation of one single product to enact a clean, non-toxic environment in all the

settings where urine bags are used. Each urine bag has a user environment inscribed in it by its producers. This user environment might not get de-scribed as the product developers have planned, but, nevertheless, its mere solidification in the material qualities of the product both enables and constrains the user of the product. Conveen Security+, just as any other bag, can only have a political potential in those locations where it enacts user environments that are appreciated and that are in accordance with the other type of politics it carries out, most notably the politics of care, inclusion and – possibly – the politics of empowerment.

Some user environments seem to directly support the use of the green bag. The relationship between user environment with minimized bacteria (in long term use of urine bags) and the non-toxic environment are partly aligned: the PVC-free bag is one of the few bags that enable low changing frequency. However, also PVC bags exist that allow for the same minimized bacteria environment. Furthermore, minimized frequency of change is in total alignment with an enactment of non-wasteful environment, another type of natural environment than the non-toxic one. The more seldom the bag is changed, the less waste is accumulated.

Secondly, there is the economic environment. The role of the economic environment enacted by the urine bag seems different in different organizations and different parts of the process of procurement and use. What is common for both procurement and user situations, however, is that due to the high price of the green bag, it is not normally even considered if a cheaper bag can provide the wanted user environment. Furthermore, the differences between organizations arise when the question of which kinds of user environments are worth enacting and paying for are posed.

On some occasions, the economic environment enacted in the green bag, however, has been reformulated by reframing the calculation according to which the price of the bag is assessed. On these occasions, the green bag is being used despite of its higher price and even under circumstances where the budgetary constraints are pronounced. Here nurses, end-users or sales consultants have reframed the economic calculations to consider the price of use rather than the price per bag. The green bag can be used for several days at the time which is not necessarily possible for some of the cheaper bags. This reflexivity of the actors in terms of questioning the calculative frames within which they are used to operate, suddenly

makes the bag compatible with the economic environment of the locality operating under a strict budget. In this sense, routine buying behavior of cheap bags is replaced with reflexive buying of bags with longer user time and thereby lower user costs. The bags might not be bought for their PVC-freeness or waste reduction abilities. Nevertheless, this reframing of the calculation in terms of focusing on user time instead of price allows the PVC-free bags to travel further into the market.

Furthermore, ways of resisting the requirement of lowest possible price can be seen in the case at hand. Peter, in the county of Arnæs, buys PVC-free urine bags if the quality is appropriate and the price is not substantially higher or if they can be bought to some particular departments only so that the increasing costs do not influence the whole urine bag product area. Helle in the municipality of Solbæk, also buys PVC-free urine bags in order to have a least one PVC-free option in the drainage bag assortment available for the municipal institutions. These types of actions bend the established order of qualities without breaking or undermining the budget. In the words of Star (1991), this "is not nonconformity, but heterogeneity" (Star 1991: 39).

To reiterate, the natural environment is confronted by other environments that are already being enacted in different locations or are envisioned. Therefore, whilst negotiating the access of environmental concerns to these locations and practices, not only is the natural environment at stake, but a whole lot of other environments as well. Where does this leave the natural environment? In this case, the enactment of the natural environment is to a great extent dependent on its compatibility with other environments. If no compatibility is achieved, the existence of the natural environment is mostly not possible; the green bag does not travel further. However, if the compatibility is achieved, the green bag might continue to different locations even though it might not be enacted as such in each of these locations.

Despite the limitations posed by the strength of user and economic environments to the enactment of the natural environment the case at hand suggests that there are several ways in which urine bags can be made devices for ecologically sustainable production and consumption to an extent beyond single events of enactment of environmental friendliness. One possible way of amplifying the use and production of environmentally friendly drainage bags would be to make environmental

friendliness a pre-qualification criterion for the production or use of urine bags. Another possibility might be to attempt to integrate environmentally friendly product qualities into different bags with different functional qualities and price levels.

In chapter 4, two ways of making environmental friendliness a prequalification of a market object for all producers and buyers were referred to. Urine bags could be made technologies for the natural environment if PVC – if it was PVC that was considered harmful – would be banned. On the other hand, the same could be achieved if PVC could be made environmentally neutral. A similar sort of effect, though not as all encompassing, could be obtained, if a public procurement agreement would only entail environmentally friendly products. In these situations, environmental friendliness would be black boxed – it would not be necessary for any other actor in the successive parts of procurement and needs appraisals to take it into consideration. Environmental friendliness would have been made an obligatory passage point (Callon 1986: 202-3) for a urine bag to travel further. If this was to succeed, the decline of harmful materials and substances would show in the statistics on use and production of assistive devices indicating the sustainability of the production and consumption of drainage bags. Urine bags would silently go about making their political work and contribute to a non-toxic, PVC-free natural environment constructed in the activities monitoring the total use of harmful substances and materials and production of waste streams. This non-toxic environment would not necessarily require explicit enactment in every single locality of use and production of urine bags.

This kind of early closures, or work of prequalification, entails black boxing a particular version of environmental friendliness. Even more than that, it entails privileging a particular version of environmental friendliness enacted by particular actors in a particular location possibly over other actor's enactments of environmental friendliness. This in itself does not necessarily imply that other enactments of environmental friendliness would be suffocated successively: in a hospital department, waste reduction, for example, can co-exist with PVC-freeness. But there is always a possibility of suppression. And certainly, the clean, non-toxic environment now enacted with the help of all the different urine bags would be a natural environment of one kind.

Early closures can also work the other way around: they can make it impossible for environmental friendliness in a particular form to become stabilized or even enacted in the following events of qualification. Examples of this could be issuing a procurement agreement without any PVC-free products or announcing DEHP as the only appropriate plasticizer in the European Pharmacopoeia.

The second way a urine bag could spread wider as political technology for the natural environment, I argued, was for it to be totally entangled in the local qualification-re-qualification processes that mostly qualify on price and functionality. The key to this entanglement lies in acknowledging that the relation of environmental friendliness to other product qualities seems to be that of a dependent quality: its existence alone does not make a producer to manufacture a green bag or a procurer or user to choose it above other products. This is a point also made in other investigations related to green products (i.e. Meyer 2001: 328, Wong et al. 1996: 269). Given the predominance of price and functionality as product criteria in product development, use and procurement, compatibility of environmental friendliness with these qualities becomes crucial. Without being compatible with the existing user environments (or their modifications) and the price level assessed as appropriate for constructing these user environments, the clean, non-toxic environment cannot be enacted on a wider scale. This implies that to be able to spread widely, the green bags would need to be compatible with several different types of user environments, some of which are already enacted with other bags. Here, price becomes crucial as many of the user environments are equipped with low priced drainage bags.

However, many issues in this case suggest that it has been difficult to develop PVC-free bags with competitive prices for all those functionalities that are already available. However, there might be ways to reconcile the conflict between price and environment by either building financial incentives into the budgets of public organizations or alternatively investigating how the price of different PVC-free bags could be brought down to the same level as similar PVC bags. One of the already mentioned ways of making the existing PVC-free bags economically more beneficial is focusing on price for use rather than price per bag in situations where the use is of a more permanent nature.

If the environmental friendliness can be made compatible with different functionalities and price levels, the green bag might travel without explicit

enactment of environmental friendliness in each location where its re-qualification is negotiated. However, as environmental friendliness in general is perceived as something positive, both amongst procurers and users, environmental friendliness of the bag can act, as suggested by some examples in this case, as added value for the green product. As far as the price and functionality issues have been settled, greenness might be a product quality that could make the choice fall on the green bag in the case of otherwise similar functionalities and prices. However, some comments from my interview persons suggest that the resources to consider additional product dimensions might be restricted.

To sum up, the case at hand features some openings that might make the politics of the natural environment stronger. Early closures, compatibility with the other environments and resistance of these are ways of enabling a non-toxic natural environment that could probably also be observed in regard to other environmentally friendly products as well. However, the difficulties in bringing a non-toxic natural environment into existence underline the dependency of environmental friendliness and a non-toxic natural environment of the other qualities and environments enacted by and with the help of the bag. The final point that I wish to deliver, then, concerns the ability of the green urine bag to become a political technology. Enactment of a non-toxic natural environment with a help of this particular technology of care is to a large extent dependent on its reconciliation with the other evolving environments to be enacted. A successful political technology for the natural environment is political in many ways.

## 8. RESUMÉ

Denne afhandling fokuserer på konstruktion af markeder for miljørigtige produkter gennem et casestudie af, hvordan miljøvenlighed som produktkvalitet er blevet udført (enacted) og forhandlet i markedet for urinposer. Afhandlingen bygger på et konstruktivistisk perspektiv på markeder: markeder og produktkvaliteter og egenskaber i urinposer anses således som emergerende og konstruerede i forskellige markedskonstituerende praksisser. De primære teoretiske begreber i afhandlingen er koordinering (coordination)(Mol et al. 2002) og kvalificering-(re)kvalificering (qualification-(re)qualification)(Callon et al. 2002).

Afhandlingen følger arbejdet for at kvalificere urinposerne i henholdsvis produktudviklingen, markedsføringen, salgs- og indkøbsfasen og i selve anvendelsen – samt i andre praksisser, hvor produktets miljøvenlighed har været på spil. Forskningsspørgsmålet lyder således:

Hvordan bliver miljøvenlighed stabiliseret og destabiliseret som en produktkvalitet blandt markedsaktørerne?

Formålet med afhandlingen er at øge forståelsen for 1) den rolle, som miljøvenlighed som produktkvalitet spiller i konstruktionen af markeder for miljørigtige produkter og for, 2) hvordan miljøvenlighed får den pågældende rolle. Afhandlingens tre empiriske kapitler handler om 1) initiativer og debatter i den offentlige sfære om miljøspørgsmål relateret til urinposer, 2) produktion af en mere miljøvenlig pose og 3) miljøspørgsmål i indkøb og anvendelse af poserne.

Miljørigtige urinposer i den offentlige sfære. I offentligheden er urinposernes miljømæssige kvaliteter blevet kædet sammen med materialerne de er lavet af, PVC. Sidst i 1980'erne blev substitution af PVC set som nøglen til miljøvenlighed i den produktgruppe, som urinposer tilhører. Substitution af PVC gennem lovkrav eller en frivillig aftale ville have stabiliseret miljøvenlighed som en produktkvalitet i form af non-PVC og have gjort det til et prækvalificeringskriterium for danske produkter på markedet. Udover substitutionstiltag var PVC udsat for flere

genindramnings-forsøg (reframing) for at gøre det til et miljømæssigt neutralt produkt ved at inddæmme de miljømæssige ”overflows”, der havde været forbundet til PVC. Hvis forsøgene havde haft succes ville de have stabiliseret miljøvenlighed som en produktkvalitet i PVC som materiale og dermed også i produkter fremstillet af PVC.

Hverken substitution- eller genindramnings-forsøgene førte til en direkte stabilisering af miljøvenlighed i urinposer i form af non-PVC eller i form af PVC som et miljømæssigt neutralt materiale. Processen med indramning og genindramning af PVC medførte imidlertid en konstant bevægelse mellem problematisering og afproblematisering af PVC i den offentlige arena. Situationen omkring PVC er ikke kølnet af og har snarere bevæget sig mellem kold og varm, af og til endda glohed (Callon 1998a: 260-61), alt imens de miljømæssige problemer relateret til PVC er blevet oversat, har ændret sig og bevæget sig i interaktion med nye tekniske løsninger på problemer, videnskabelige resultater og politik.

Produktudvikling og markedsføring af en PVC-fri urinpose. I produktudviklingen af en specifik urinpose blev miljøvenlighed yderligere ”enacted” i relation til PVC, hvilket resulterede i en urinpose fremstillet af PVC-frie materialer. Under produktudviklingen viste de PVC-frie materialer sig at være inkompatible med nogle af de andre produktkvaliteter, såsom knækfri slange, brugssikkerhed og diskretion. Det var imidlertid muligt for produktudviklerne at finde alternative løsninger, der gjorde miljøvenlighed kompatibel med andre tilstræbte kvaliteter. I mange tilfælde blev koordineringen (Mol 2002) og valget mellem miljøvenlighed og andre produktkvaliteter undgået, enten gennem kompromiser og justeringer i andre produktdimensioner, adskillelse af de inkompatible produktelementer fra hinanden eller gennem udsættelse af koordineringen. I nogle tilfælde blev PVC-frihed også privilegeret over andre produktkvaliteter for at muliggøre eksistensen af et PVC-frit produkt. Miljøvenligheden spillede en rolle i markedsføringen, men at posen var PVC-fri blev nedtonet i de skriftlige markedsføringsmaterialer. I selve salgssituationerne understregede salgskonsulenterne også andre produktkvaliteter fremfor de PVC-frie materialer. Denne nedtoning var et resultat af forhandlinger mellem dette PVC-frie produkt, producentens PVC-produkter og brugernes betalingsvillighed for PVC-frie produkter. Miljøvenlighed blev ikke endegyldigt stabiliseret, selvom produktet blev fremstillet af særlige materialer.



Miljøvenlighed og urinposer på efterspørgselssiden. I denne case viste miljøvenlighed sig at være en skrøbelig produktkvalitet, der blev ”enacted” på forskellige måder og i forskellige styrker på forskellige steder – og nogle steder slet ikke. Købersiden var præget af en række diskontinuiteter i forhold til tid, rum og deltagere i købsprocessen. Miljørigtighed var også både til stede og fraværende i sine forskellige former blandt disse diskontinuiteter. Sammenhængen mellem miljømæssige og sundhedsmæssige bekymringer var tydelig i såvel indkøb som anvendelse af urinposerne. Dette var også tilfældet i produktudviklingen, markedsføringen og i den offentlige sfære.

Når miljøvenlighed blev ”enacted ” som en produktkvalitet var det altid afhængigt af andre produktkvaliteter, primært pris og funktionalitet. Privilegering af miljøvenlighed, uanset dets afhængighed, opstod i to former: Privilegering fremfor pris op til et vist prisleje eller indenfor en bestemt underkategori af købere og privilegering fremfor andre produktkvaliteter i tilfælde af, at udbuddet ikke omfattede andre PVC-frie produkter. Udover privilegering og muliggørelse af sameksistens var miljøvenlighed relateret til andre produktkvaliteter som en form for ”added value” til disse kvaliteter.

I de tilfælde, hvor miljøvenlighed enten blev direkte overset, eller hvor det simpelthen var fraværende, har jeg foreslået flere forskellige årsager, der kan være medvirkende hertil. Nogle af årsagerne var forbundet til en direkte destabilisering af miljøvenlighedens vægt i produktgruppen generelt eller en tvivl om de absolutte miljømæssige konsekvenser af produktmaterialer. Herudover blev miljøvenlighed som årsag til bekymring også effektivt placeret på et sidespor gennem et restriktivt fokus på andre kvaliteter. Min påstand er, at denne udvikling blev fremmet gennem fremvækst af en særlige type af kalkulative rum bestående af kæder af kalkulative værktøjer (devices), som fx budgettet, regneark etc., der videreførte den dominerende prioritering af lav pris og passende funktionalitet fra sted til sted og fra praksis til praksis.

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Med det nuværende fokus på miljøvenlighed som produktkvalitet findes der ikke nogen entydig markedskonfiguration i markedet for urinposer. Miljørigtighed bliver ”enacted” i forskellige versioner på forskellige steder og i forskellige praksisser. Fravær af PVC er tilsyneladende den mest udbredte version af

miljøvenlighed, delvis fordi denne version er støttet af omfattende videnskabeligt og teknologisk arbejde. Opmærksomheden på miljøspørgsmål er imidlertid også fraværende fra mange markedskonstituerende praksisser. Selv i de praksisser og blandt de aktører, der rent faktisk er opmærksomme på miljømæssige konsekvenser synes miljøvenlighed samtidig at være en skrøbelig kvalitet, der ofte bliver tilsidesat når andre kvaliteter viser sig vigtigere for kvalificeringen af produktet. I forhold til miljøvenlighed forekommer markederne for urinposer altså at være varierede og fragmenterede.

I denne case konstrueres markederne for urinposer i et samspil mellem flere forskellige aktører: købere, professionelle brugere, slutbrugere og de politikere, der vedtager love om finansiering af hjælpemidler og om allokering af midler til hospitaler og kommunale organisationer. De forskellige markedsaktørers praksisser påvirker hinanden og bidrager til de kvaliteter, som produktet antager under kvalificeringsprocessen. Disse markedsaktører er i sig selv hverken miljøvenlige eller uinteresserede i miljøet. Hvis og når de antager mere eller mindre miljøvenlige karakteristika sker det snarere som et resultat af processer, hvor de bliver udrustet med miljørigtige produkter og måder, hvorpå de kan artikulere produkternes miljømæssige kvaliteter. De er ydermere i stand til at reflektere og forestille sig alternative virkeligheder og til at reformulere deres strategier og ensrette miljøvenlighed med deres andre målsætninger.

I hver eneste begivenhed i kvalificeringen af et produkt er markederne potentielt åbne for genforhandling. Ændringer i principperne for produktkvalificering reformaterer markederne i mere eller mindre grad. Forsøgene på at ændre rangordningen og den relationelle betydning mellem forskellige produktkvaliteter fejler imidlertid oftere end de lykkes. Undersøgelser af kvalificeringsarbejdet foretaget på forskellige steder og i forskellige praksisser afslører et antal meget stabile aktørkonstellationer relateret til alle forskellige slags markedskonstitutive praksisser. Disse aktørkonstellationer består af devises, politikker, mennesker – de er hybride netværk karakteriseret af distribueret agens (distributed agency) – og kvalificerer sig primært i form af pris og funktionalitet. Hvis miljøvenlighed opnår stabilitet i kvalificeringsprocessen sker det ofte ved at det målrettes i overensstemmelse med andre produktkvaliteter og omvendt. Dette ses tydeligt i den måde, hvorpå miljøvenlighed er afhængig af især pris og funktionalitet, der også er resultat af forhandling. Det passende pris- og funktionalitetsniveau varierer

markant fra sted til sted, men det er kun sjældent, at de ikke er fastsat forud for de eventuelle miljømæssige overvejelser.



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## Appendix I: LIST OF INTERVIEW PERSONS

Name	Position	Times interviewed	Personal history
<b>Coloplast</b>			
1. Mathilde	Chief of product development, previously product	4	Product development engineer 1987-8, Chief of product development 1988-1998, chief of quality department 1998-2004
2. Mikkel	Chief of commercial development	1	1986 – early 1990 Director of Coloplast Denmark 1990-1993
3. Johan	Product development engineer	1	1988 – end of 1990
4. Lise	Product manager	1	1985 - late1989
5. Harry	Product manager	1	late1989-1995
6. Paola	Product manager	1	1998-2001
7. Carsten	Marketing assisstant	1	1997/1998-2000, Junior line manager 2002-4
8. Joakim	Product manager	1	2005-)
9. Anton	Environmental consultant	1	early 1990s
10. Martin	Product development engineer	1	1986(?)-
11. Håkan	Marketing assisstant	1	2002-
12. Maria	Environmental officer	1	2000-2006
<b>Coloplast Denmark</b>			
13. Gerhard	Marketing assistent	3	1986-
14. Karin	Sales consultant		1987-1994
15. Kirsten	Product line manager	2	1989-1993
16. Marlene	Product line manager	(2 with Gerhard)	2004-

<b>Municipality of Solbæk</b>			
17. Helle	Procurement officer	2	2003-
18. Marina	Health care assistant in a centre for disabled	1	1999- (1996-1999 in another organization in the same municipality)
19. Kalle	Nurse in home nursing unit A	1	1983-
20. Julie	Nurse in home nursing unit B	1	1997- (and 1977-1997 in a municipal hospital)
21. Hamid	Nurse in home nursing unit B	1	2001- (and 1984-2001 with incontinence in other organizations within the same municipality and a county)
22. Laila	Head nurse in self administrating care home A	1	1987-
23. Marianne	Head nurse care home B	1	1995- (1983-1995 in different care homes in Solbæk and another municipality)
24. Monica	Adminstrator	1	1994-
25. Ulrik	Adminstrator	1	2001-
26. Anne	Adminstrator	1	2001-
<b>County of Arnæs</b>			
27. Peter	Procurement officer	2	1985-
28. Lotte	Nurse in county hospital C	1	1987-
<b>County of Fredenshus</b>			
29. Jonna	Procurement officer	2	1996-2006
30. Anders	Procurement officer	(1 together with Jonna)	1998-2000; 2007-
31. Robin	Nurse in county hospital D	1	1987
32. Vera	Nurse in county hospital E	1	1997

<b>County of Sellå</b>			
33. Henriette	Nurse in county hospital F	1	1976-
<b>Rehabilitation clinic A</b>			
34. Hans	Nurse	1	1988
<b>Rehabilitation clinic B</b>			
35. Kira	Health care assistant	1	Dealt with urine bas and their procurement 2001-
<b>End-users</b>			
36. Einar		1	
37. Leo		1	
38. Mimmi		1	
<b>Wholeseller</b>			
39. Palle	Sales consultant	1	1999-
<b>The association of counties</b>			
40. Sanne	Chief consultant	1	2001-





## Appendix II: LIST OF PRODUCT DEVELOPMENT DOCUMENTS

Coloplast 1988: Project plan 3.22.1988  
Coloplast 1989a: Grundspekifikation 7.11.1989  
Coloplast 1989b: Rapportering af teknisk udredning 13.7.1989, Testprocedure for alternative foliematerialer 27.4.1989, Testprocedure for alternative slangematerialer 27.4.1989  
Coloplast 1990a: Designreview 7.12.1990  
Coloplast 1990b: Design review mode referat 19.12.1990  
Coloplast 1990c: Dokumentation af folie, February 1990  
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Coloplast 1991h: Ydre miljø i Internt notat 1991  
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Coloplast 1992d: Testrapport Urinposer CD/ISO 8669-2 1992  
Coloplast 1992e: Volumindhold af urinposer 19.6.1992  
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Coloplast 1993a: EU declaration to conformity to Council Directive 93/42/EEC and amendments concerning Medical Devices

Coloplast 1993b: Mødereferat (projekt afslutning) 2.2.1993

Coloplast 1993c: Parts of the Device mastery file 6.10.1993

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Coloplast 1993f: Test af glat stykke på korrugeret slange 1993

Coloplast 1994a: Bacteriological investigation of Inlet Tube 8.8.1994

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Coloplast 1994c: Mødereferat 7.2.1994, vedrørende Kvalitetsudvalgsmøde

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Coloplast 1996: Test report 15.10.1996

Coloplast 2002: Produkt risikoanalyse 24.6.02

Coloplast 2004: Design history file made in 11.11.2004

Coloplast 2005a: Biological evaluation October 2005 + copy of the Chemical characterization of the device

Coloplast 2005b: Description and classification of Conveen Sec+ Urine Bags – sterile and non-sterile, 13.10.2005

Coloplast 2005c: Deviation of Conveen Sec+ leg bag from the standard ISO 8669-2 'urine collection bags, part 2: Requirements and test methods' 21.10.2005

Coloplast 2005d: Scantox expert statement 21.10.2005

Coloplast 2005 e: Statement: tox reactions 18.10.2005

## Appendix III: MARKETING MATERIALS

Coloplast Denmark 2006 Moveen Urine Bag promotion data blad  
Coloplast Denmark 2006 Conveen Security+ Urine Bag Promotion data blad  
Coloplast 2005 Conveen Security+ Environmental and disposal information  
Coloplast Denmark 1998 Giv brugerne mulighed for selv at vælge! Brochyr on  
Conveen Security+ urinary collection system  
Coloplast Denmark 1998 Internal Conveen Security+ campaign materials  
Coloplast 1997 Conveen Security+ Urine Bag promotion data sheet (in  
English)  
Coloplast early 1990s Conveen Security+ Urine Bag promotion data sheet (in  
English)  
Coloplast 1993/4 Conveen Security+ Urine Bag Product information  
Conveen  
Coloplast 1992 Conveen Security+ Urine Bag Launch binder June 1992



# Appendix IV: SINERFA DATA SHEET



## Product data sheet

### Product name

<b>1. Company data</b>		
<b>1.1. Manufacturer:</b>  Name _____ Address _____ Country _____ Website _____	<b>1.2. Distributor:</b>  Name _____ Address _____ Phone no. _____ Fax no. _____ E-mail _____ Website _____	
<b>Quality management systems:</b>  Manufacturer: _____ Distributor: _____		
<b>2. Product</b>		
<b>2.1 Trade name</b> _____		
<b>2.2. List of product range:</b>  <div style="display: flex; justify-content: space-around;"> <span style="border: 1px solid black; padding: 2px;">See "Product range" (if Excel file)</span> <span style="border: 1px solid black; padding: 2px;">"Click here" (if web based)</span> </div>		
<b>2.3. More information about the product</b>  <div style="display: flex; justify-content: space-around;"> <span style="border: 1px solid black; padding: 2px;">See "More information" (if Excel file)</span> <span style="border: 1px solid black; padding: 2px;">"Click here" (if web based)</span> </div>		
<b>3. Product components</b> <span style="float: right; font-size: small;">(For sterile products including the item package/sterile barrier)</span>		
Cardboard: <input style="width: 60px;" type="text"/>  Metal: <input style="width: 60px;" type="text"/>  Other: _____	Paper: <input style="width: 60px;" type="text"/>  Latex: <input style="width: 60px;" type="text"/>	Glass: <input style="width: 60px;" type="text"/>  Cotton: <input style="width: 60px;" type="text"/> Organic: <input style="width: 60px;" type="text"/>
<b>3.2. Plastics:</b>  Types of plastic: _____ PVC: <input style="width: 60px;" type="text"/> If PVC, state plasticiser: _____ % of PVC: _____		
<b>3.3. Heavy metals, chlorine, etc.:</b>  Heavy metals: <input style="width: 60px;" type="text"/> Types: _____  Chlorine bleached material: <input style="width: 60px;" type="text"/> Recycled materials: <input style="width: 60px;" type="text"/> Are substances from the Environmental Agency's list of undesirable substances included? : <input style="width: 60px;" type="text"/> State substances: <u>Note: By agreement with Sinerfa, this point takes effect only from 1 June 2003!!</u>		

<b>4. Packaging components</b>		(For sterile products <b>excluding</b> the item package/sterile barrier)		
Cardboard: <input style="width: 100px;" type="text"/>	Paper: <input style="width: 100px;" type="text"/>	Glass: <input style="width: 100px;" type="text"/>		
Metal: <input style="width: 100px;" type="text"/>	Latex: <input style="width: 100px;" type="text"/>	Cotton: <input style="width: 100px;" type="text"/>		
Other: <input style="width: 150px;" type="text"/>		Organic: <input style="width: 100px;" type="text"/>		
<b>4.2. Plastics:</b>				
Types of plastic: <input style="width: 250px;" type="text"/>		PVC: <input style="width: 100px;" type="text"/>		
If PVC, state plasticiser: <input style="width: 200px;" type="text"/>		% of PVC: <input style="width: 100px;" type="text"/>		
<b>4.3. Heavy metals, chlorine, etc.:</b>				
Heavy metals: <input style="width: 100px;" type="text"/>	Types: <input style="width: 200px;" type="text"/>			
Chlorine bleached material: <input style="width: 100px;" type="text"/>	Recycled materials: <input style="width: 100px;" type="text"/>			
State any substances from the Environmental Agency's list of undesirable substances: <input style="width: 150px;" type="text"/>				
<i>Note: By agreement with Sinerfa this point takes effect only from 1 June 2003!!</i>				
<b>5. CE marking</b>				
5.1. CE mark:	No: <input style="width: 80px;" type="text"/>	Yes: <input style="width: 80px;" type="text"/>	Class: <input style="width: 100px;" type="text"/>	
<b>6. Environmental information</b>				
6.1. Does a recognised env. label exist for the product area?		Yes: <input style="width: 80px;" type="text"/>	No: <input style="width: 80px;" type="text"/>	
6.2. Does the product carry an environmental label?		No: <input style="width: 80px;" type="text"/>	Yes: <input style="width: 80px;" type="text"/> Label: <input style="width: 150px;" type="text"/>	
6.3. Environmental management systems: (State recognised environmental management systems, if any)				
Manufacturer: <input style="width: 200px;" type="text"/>		Distributor: <input style="width: 200px;" type="text"/>		
<b>7. Shelf life</b>				
Shelf life after date of manufacture / date of sterilisation:			<input style="width: 150px;" type="text"/>	
<b>8. Recommended storage and handling</b>				
State recommendations <input style="width: 400px;" type="text"/>				
<b>9. Recommendations for waste handling</b>				
Please note: Any internal waste handling rules of the purchaser must be observed!				
<b>Recommendation = X</b>	Incineration	Landfill	Recycling	Recycling label
Product	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Item package	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Inner package	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Transport packaging	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

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