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The relationship between competitiveness, environmental performance and management of small and medium sized European manufacturing firms

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INSTITUT FÜR
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Zusammenfassung

Kleine und mittlere Unternehmen (KMU) sehen sich häufig nicht dazu in der Lage, die ökologischen Aspekte ihrer Geschäftsaktivitäten proaktiv zu bearbeiten. Dies hängt nicht zuletzt mit der Erwartung zusammen, mit Investitionen in den betrieblichen Umweltschutz seien Nachteile für die Wettwerbsfähigkeit des Unternehmens verbunden. Vor diesem Hintergrund wurden in der dieser Veröffentlichung zu Grunde liegenden Studie die Beziehungen zwischen Ökonomie und Ökologie auf der Ebene von KMU in vier Ländern (Deutschland, Großbritannien, Irland, Italien) und drei Sektoren (Möbel, Textilveredelung, Obst- und Gemüseverarbeitung) empirisch erforscht. Es zeigte sich einerseits, dass die Durchführung von Umweltinitiativen die ökonomische Positionierung von Unternehmen positiv beeinflussen kann. Andererseits wurde deutlich, dass die Annahme, zwischen Wettbewerbsfähigkeit und Umweltleistung von KMU bestünden positive Rückkoppelungseffekte, nicht zutreffend ist. Das Gegenteil allerdings ist auch nicht der Fall, dass heißt Unternehmen mit hoher Umweltleistung haben keinen Wettbewerbsnachteil gegenüber ökologisch weniger profilierten Konkurrenten. Die vorliegende Veröffentlichung dokumentiert detailliert die Ergebnisse der in Deutschland durchgeführten Arbeiten. Die internationalen Ergebnisse des Projektes sind IN Buchform veröffentlicht worden: Hitchens, David; Trainor, Mary; Clausen, Jens; Thankappan, Samarthia; De Marchi, Bruna: Small and Medium Sized Companies in Europe. Environmental Performance, Competitiveness and Management. International EU Case Studies. Spinger. Berlin, Heidelberg, New York 2003.

Abstract: The relationship between competitiveness, environmental performance and management of small and medium sized European manufacturing firms

The environmental performance of SMEs (Small and Medium sized Enterprises) is an area of major policy concern. The research project deals with factors influencing the environmental performance of SMEs across four European countries: the UK, Ireland, Germany and Italy. While there are a range of factors which are expected to influence the take up of clean technology, this publication focuses on three key hypotheses, namely firm competitiveness, culture and use and availability of information and advice. The publication concentrates on results from Germany. International results are available in: Hitchens, David; Trainor, Mary; Clausen, Jens; Thankappan, Samarthia; De Marchi, Bruna: Small and Medium Sized Companies in Europe. Environmental Performance, Competitiveness and Management. International EU Case Studies. Spinger. Berlin, Heidelberg, New York 2003.

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Content

1 Background of the study: Research aims and objectives

The objective of this research is to identify factors which promote and constrain the adoption of environmental initiatives by SMEs with the objective of informing how policy can overcome obstacles and promote the adoption of environmental initiatives by industry. This will be the first study of the impact of environmental services on the environmental and economic performance of firms, including the pattern of use of such services, including gaps and weaknesses arising from firm location and characteristics (Hitchens, O'Farrell and Conway, 1996b). The findings are expected to be of general relevance to SMEs. The policy significance lies in the investigation of the importance of the contribution of specialist environmental services to the environmental performance of firms in addition to their impact on manufacturing competitiveness and employment. Policy implications will flow from the national studies by identifying the effects of different policies existing inter-regionally and internationally within the EU on service use and outcomes.

The research tried to identify:

(a) those factors which vary between industries and firms which influence the adoption of clean technologies (meso level) viz. regulation, costs of compliance, product type and customer relationships, firm size, ownership, skill base, R&D etc.,

(b) those factors which influence differences in environmental performance among similar companies (micro level) viz. labour force quality, environmental awareness of management, difference in major drivers, cost of compliance, regulation,

(c) identify costs and benefits arising from the adoption of environmental initiatives (including productivity, competitiveness and employment effects), investment appraisal techniques, pay back periods etc.,

(d) undertake case histories of the process of adoption,

(e) investigate expected costs and benefits, identify obstacles and factors facilitating adoption from suppliers of clean technologies including service suppliers and

(f) identify from major customers strengths and weaknesses encountered in the SME sector.

Central to the research is the testing of a set of hypotheses which are expected to influence the adoption of cleaner technologies. In particular three interrelated hypotheses are focused upon: these concern firm competitiveness; management environmental awareness/culture; and external information sources, relationships and linkages to the firm (trade associations, universities, R&D organisations, official government sources, business to business networks, environmental consultants, customers, suppliers etc.).

1.1 Hypotheses and relationships considered

(i.) It is hypothesised that best practice firms, measured in an international and national setting, will respond to environmental pressures with best practice solutions. It is anticipated therefore that such competitive firms in general, regardless of country of operation, will undertake more environmental initiatives and such firms will have a management culture which is better informed with respect to making environmental decisions.

(ii.) In an international context, the *sources of international differences in average productivity* achieved by firms (e.g. physical and human capital, R&D, product and process innovation) are hypothesised to be *causally associated* with the *solutions to the environmental pressures.*

(iii.) Management culture is important. In fact some managers are more likely than others to "internalise the externality" of environmental effects (i.e. they will seek to avoid negative environmental outcomes even when these are purely externalities; cases where the existing environmental regulations still do not force firms to take social costs into account in their cost calculations). Such management behaviour could result from an ethical commitment to valuing the environment *per se* and/or a market structure which relaxes the constraint on firms to maximise profits and therefore allow the pursuit of a wider range of management goals. *The role of top management is important for an understanding of how firms become convinced to choose cleaner technologies given the competitive position of the enterprise.*

(iv.) Firms with *modern plant and machinery* are hypothesised to *have relatively good environmental performance*. The age of the plant and machinery in each firm is likely to impact on environmental outcomes, costs of compliance and the number of clean technology initiatives. Broadly speaking, it could be anticipated that the *more up-to-date equipment will embody the best environmental technology*. The status quo is maintained when industrial facilities are old and capital turnover is low. However, having such up-to-date relatively clean machinery could also mean that such a company did not require as many clean technology initiatives as a counterpart trying to come to terms with the implications of older and dirtier machinery.

(v.) Firms with an abundance of skills will undertake more initiatives to reduce environmental pollution, those firms more engaged in R&D, are likely to find ways to reduce pollution and introduce clean technologies (including through incremental innovation). The presence of skills is important, though it is also important to recognise that some clean technologies and innovation requirements to deal with environmental effects may require skills different from those necessary for the firm to compete in its usual line of business.

(vi.) The R&D activity of the firm is expected to play a critical role in the adoption and development of clean technologies and because of its relationship with competitiveness, R&D is also seen as the means through which business develops environmentally benign products and processes.

(vii.) Environmental initiatives are also hypothesised to be related to the stringency of environmental standards, levels of enforcement and environmental costs, and the relative importance of other drivers faced by the firm. Grants and subsidies will be expected to raise the take-up of clean technologies. The investigation proposed here, by including firms at an EU-level (across a range of countries/regions), will involve a variety of regulatory climates, costs and other drivers.

(viii.) What is the impact on competitiveness and employment of the use of environmental initiatives? Increasing environmental standards can effect productivity either positively or negatively. High standards can push firms on to a higher growth path by forcing them to make product and process changes which yield higher competitiveness. If this happened it would represent part of the so-called "double dividend", i.e. gains in environmental performance would also be accompanied by increased economic performance.

(ix.) The employment implication will be measured but the direction of the effect is not clear a priori. The direct impact is likely to be positive (if more persons are engaged to undertake environmental initiatives) while the indirect effect depends upon the environmental input impact on competitiveness.

(x.) Imperfect information is inherent to the process of technological change and markets for information are notorious for being imperfect. In addition the skill and know how of management and the labour force at SMEs is variable. It is therefore hypothesised that suppliers, customers, environmental and other consultants and agencies are important in enabling firms to adopt environmental initiatives. Hence the research will focus on the importance of the take up and use made of external bodies for information, advice and consultancy in the adoption and implementation of environmental initiatives, including in-

puts to R&D, skills and management. The pattern and extent of use will be measured e.g. with respect to firm size, ownership, product etc. The environmental and productivity outcome following the service input will be quantified. In addition the impact of service input on the culture of firm will be examined.

These hypothesises are after all connected and figure 1.1 tries to elucidate this connection.

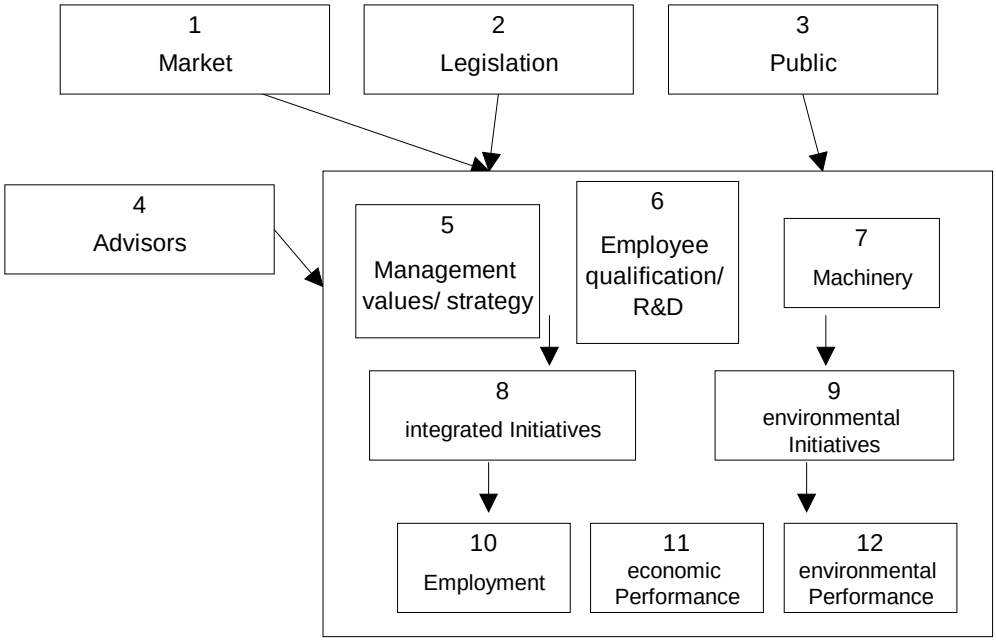


Fig. 1.1: The model of connection of hypothesises

In general, we are dividing hypothesises related to input and output factors. The input-related hypothesises include the impact of external driving forces (hyp. vii: market, legislation, public), the age of plants and machinery (hyp. iv), skliis and R&D (hyp. v and vi), management values and strategy (hyp. iii) and informational sources (hyp. x) on the environmental and economic performance of the company. Driven by these forces and motivations a company might implement initiatives, which only target environmental performance or, if possible, implement initiatives which integrate economic and environmental aims. These would in turn produce environmental as well as economical results. The output related hypothesises then include the assuption, that best practice firms will find best environmental sollutions (hyp I), they will eventually achieve a double dividend (hyp. viii) and there might be an impact on employment (hyp. ix).

The analysis of the findings in the three sectors (chapters 5 to 7) follow this structure of hypothesises.

2 Project Methodology

2.1 Identification and measurement of key variables

Precise measurement of the variables was essential for the research. However the broad form of measurement of four variables: environmental performance, competitiveness, management culture and service inputs is given below.

2.1.1 Identification of environmental performance

There are different approaches to measuring environmental performance and this research used a mix of methods. It had to be taken into account, that controlling procedures in SMEs are rarely developed and environmental performance indicators like those proposed by ISO 14 031 (Environmental Performance Evaluation) can not be expected to be readily available in average enterprises.

After all, a thorough set of pieces of information could be identified, which could be supplied in most of the interviews. The general idea of environmental performance measurement was:

- to evaluate the effort behind environmental management systems,
- to evaluate the number and quality of process oriented environmental protection activities and to take into account, to what degree the firm is aware of their success,
- to evaluate the range and quality of product oriented environmental protection activities and the related activity concerning marketing and market communication.

The individual activities taken into account varied from sector to sector. Air protection was e.g. an important activity in furniture production (due to solvent emissions) but was of no importance in fruit and vegetable processing. In that sector, it was subsequently replaced by water protection, which in turn is unimportant in furniture manufacturing.

By carrying out individual initiatives firms scored points. Since the target of the evaluation of environmental performance was the identification of generally excellent firms, points were distributed for a wide spectrum of different initiatives. But in each area of activity, only a limited number of points could be scored, e.g. if a firm divided more than six waste streams, it would not get more than two points for waste management. To award e.g. 10 points for 10 waste streams would have boosted the importance of waste management. And it can generally be assumed, that the most important waste streams will be separated first, the most important energy saving measures will be initiated first and so on. Overall, the most points cold be scored in environmental process control, of second importance was environmental management and only 20 to 25 % of points could be scored for ecological raw material and products (see table 2.4).

It was originally intended to award a high percentage of points for output oriented measures of “environmental effects”. But accounting systems in place were generally not good enough to deliver high quality data. Additionally, the comparability of data between firms was very low. Differences of product ranges, production methods employed and accounting instruments amounted to complete non-comparability of data. In tests for some subgroups within sectors, e.g. the furniture firms in possession of energy data, no correlation of overall energy use and applied energy saving technology could be proven. The use of output measures of environmental performance was subsequently limited to awarding a point if a firm was in possession of some form of output data at all – following the idea “What gets measured gets done!!.

For the postal questionnaires, a short version was adopted. Since there were questions concerning 11 initiatives and no other information on performance available, we only counted the number of initiatives. Groups were formed: compliance: 0 to 2 initiatives; compliance+: 3 to 5 initiatives; excellence: 6 or more initiatives.

The detailed system of environmental performance measurement on bases of the long questionnaires is given in the following table:

Method for ranking firm's environmental performance (furniture industry)					
Variables	Points for rating are given if:				
1. Environmental management	0	1/3	2/3	1	2
Is there someone whose job involves addressing the environmental aspects?	no			Yes	
Do you have an environmental policy?	no	we discussed the idea	there is a draft version	there is an official version	
Do you have an environmental improvement programme?	no	targets, but not documented	draft version	official version	
Does an environmental team exist?	no	1 meeting in past 12 months	2 meetings in past 12 months	3+ meetings in past 12 months	
Do you evaluate environmental performance of suppliers?	no	yes, there were tests	yes, for many suppliers	protocols for every supplier	
Is a management system according to EMAS or ISO 14 001 implemented or planned in the next 3 years?	No			Yes	
Was the EMS certified externally?	No			Yes	
Which instruments of environmental communication do you use?	none			One	two or more
2. Environmental process control					
Are activities in solvent reduction in place?	none			One	two or more
What environmental effect was achieved?	unknown			known	
Which waste streams do you separate?	up to two separated waste stream			three to five separated waste stream	six or more separated waste streams
What environmental effect was achieved?	unknown			known	
Are activities in energy saving in place?	none			One	two or more
What environmental effect was achieved?	unknown			known	
Are activities in environmental friendly packaging in place?	none			One	two or more
What environmental effect was achieved?	unknown			known	
3. Ecological raw material and products					
Do you have products with a defined ecological marketing strategy?	no			Yes	
Do you avoid certain substances within raw materials?	none			One substance avoided	two or more substances

					avoided
Do you use natural/ ecological materials?	no			One material	two or more materials
If there is a declared Eco-Design scheme?	no			Yes	
Did you ever get an award for good design?	no			Yes	

Tab. 2.1: Method for ranking firm's environmental performance (furniture industry)

Method for ranking firm's environmental performance (textile finishing industry)					
Variables	Points for rating are given if:				
1. Environmental management	0	1/3	2/3	1	2
Do you collect data to use for controlling environmental improvement?	No	yes, some single data	yes, periodically some data	yes, systematically	
rest identical to furniture (but environmental programme not considered)					
2. Environmental process control					
Identical to furniture, one additional initiative:					
Are activities in water saving and protection in place?	none			One	Two or more
What environmental effect was achieved?	unknown			Known	
3. Ecological raw material and products					
How do you co-operate in environmental projects in the textile chain?	In no way			One initiative	Two or more initiatives
Do you avoid certain substances within raw materials?	none			One substance avoided	Two or more substances avoided
Do you use natural/ ecological materials?	no			one material	
Are your products certified according to Eco-Tex Standard 100?	no			Yes	

Tab. 2.2: Method for ranking firm's environmental performance (textile finishing industry)

Method for ranking firm's environmental performance (fruit and vegetable processing)					
Variables	Points for rating are given if:				
1. Environmental management	0	1/3	2/3	1	2
Do you collect data to use for controlling environmental improvement?	no	yes, some single data	yes, periodically some data	yes, systematically	
rest identical to furniture					
2. Environmental process control					
identical to furniture, solvent reduction replaced by:					
Are activities in water use and water protection in place?	None			One	two or more
What environmental effect was achieved?	unknown			Known	
3. Ecological raw material and products					
Do you use organic raw material?	no			Products produced under contracts containing elements of organic agriculture	Products of organic agriculture
Which percentage of organic raw material do you process?	none			Up to 30%	over 30%
Do you avoid certain artificial raw materials?	none			one substance avoided	two or more substances avoided
Do you market organic products?	none			yes	
Do you have a regional sourcing strategy?	no			yes	

Tab. 2.3: Method for ranking firm's environmental performance (fruit and vegetable processing)

All points were added and the overall sum calculated. The maximum for each sector is given in the table:

Sub-variables	**Maximum points to score**		
	Furniture	textile	fruit and veg
Environmental management	9	9	10
environmental process control	12	15	12
ecological raw material and products	7	6	8
Total	28	30	30

Tab. 2.4: Maximum score in the three sectors

Finally, in the German sample all firms with less than 13 points were grouped in the compliance-group, all those with 18 or more points were grouped as excellence firms and those between grouped in the compliance+ group.

2.1.2 Identification of competitiveness of the firms

A number of indicators of competitiveness were proposed. The level of labour productivity was measured both nationally and internationally. Identification of national competitiveness was based on the relative level of value added per employee and physical productivity per employee. The extent to which firms export could be taken as further evidence of the extent of competitiveness, and firms were ranked according to whether they were relatively strong or weak exporters. Further indicators of competitiveness, based on employment change and profitability were included.

The competitiveness impact of environmental initiatives was measured and included estimates of financial benefits through cost savings and revenue generated through reduced material inputs (including packaging), reduced waste, water and energy inputs, recovery, recycling, reuse, use of by products, reduced cost of end of pipe solutions, productivity improvements through improved efficiency, improved process technology, product redesign and new skills, functional links R&D, design, production and commercial benefits through marketing and public image, product diversification and redesign, innovation, marketing of environmentally-friendly products Firms were asked to comment on the economic impact of each individual initiative concerning labour input, cost, sales, price, market position, competitiveness, image, profit and finally risk.

The financial costs associated with environmental inputs were asked for, if available. They included the cost of environmental inputs (both capital and running costs), firm inputs (management time, direct and indirect labour costs), cost of in-house innovation, in addition to bought in cleaner technology, equipment and services (including consultancy services).

2.1.3 Measurement of management environmental awareness, culture and attitudes.

Consideration of this type of variable tried to gauge the firms' environmental values and the company's response to environmental needs and pressures. Development of the conceptual background formed part of the research and was based on interviewees' knowledge and beliefs about environmental damage, protection, regulation and company plans and behaviour. Models have been developed which informed the research on how to relate company values with environmental behaviour (compliance or enhanced environmental review and performance) and competitive and market opportunities arising from an environmental agenda.

2.1.4 Measurement of external advisory inputs

In investigating the process of adoption questions were asked on how the adoption was implemented including the use of advisory services, the importance of support including grants, the importance of firm networks, supplier chain relationships, source of in-house and external expertise, involvement of technical expertise within the firm, support of top management, marketing and purchasing departments, availability of finance, environmental awareness, importance of innovation.

Interviews tried to elucidate on the impact of each of these external agents on the firm. The quality and cost of service inputs was asked for with respect to any measurable impact on the business (by way of increased sales, productivity improvements, reduced costs etc.).

The research did also ask for pressures, responses and sources of available information from customers, suppliers, consultants, advisory sources. Consideration were given to a range of issues including the setting of environmental standards for suppliers by custom-

ers; help given by suppliers and customers to choose, innovate and develop cleaner production technologies. We were looking for evidence of the importance of advisory sources for informing SMEs about technologies for cleaner production and products and evidence on the strengths and weaknesses of SMEs in their response to environmental pressures, e.g. with respect to technological or managerial know how.

2.2 Methods

Three methods of data collection were applied:

(a) a survey to yield 300 returns in each of the three countries (postal or telephone survey),

(b) interviews with 100 manufacturing companies,

(c) 100 interviews with consultants, advisors, suppliers, customers etc.

(d) use of focus groups to investigate more deeply the impact of firm 'culture' on environmental initiatives and performance.

Since on one hand, the results of the cultural analysis – being a multi-influence variable - remained a bit foggy and even in the ISIG no clear theory or even hypothesises could be developed, and on the other had, a lot of facts at the end of the project lacked explanation, the German team used the focus groups for presenting not only the cultural variable but an overview of results to different stakeholder groups of the respective sectors. Stakeholders from business associations, firms, science, consultancies and from business partners (clients and suppliers) of the firms supplied useful information to clear up open questions.

The work covered SMEs (up to 500 employees) in three sectors where environmental impacts and costs are significant. These sectors were furniture manufacturing, textile finishing companies and fruit and vegetables processing.

2.3 Workpackages

There were three separate issues or focal points that the empirical work tried to examine.

Workpackage (1.):

What is the incidence and breadth of use of clean technology by SME's and what is the process through which these technologies are acquired? What are the constraints on their adoption? These issues were addressed in a large scale survey using a brief questionnaire in each country. The survey provided a general overview of the existing situation on the overall use and economic impact of environmental inputs by SMEs and to 'skim' the subjects to be approached in subsequent stages. It was performed on a large sample of SMEs covering practically the complete sectors.

Workpackage (2.):

The second matter was to examine in detail the environmental and economic performance of individual firms; the management culture; processes of adoption and constraints. Particularly environmental performance, competitive performance, information and management culture were considered. These questions were addressed in face to face interviews in each sector.

Firms were divided according to their environmental performance, between those which:

(a) try to achieve no more than compliance with regulation,

(b) go beyond compliance (compliance +), and

(c) try to achieve excellence.

Each of these environmental performance levels were defined (see above). Factors influencing environmental decisions and performance of firms in each of these categories were examined by matching firms across categories with respect to product and size.

Work Package (3.):

The third focus is on sources of information and advice as coming from customers, suppliers, consultants and other advisory sources. This third question was examined in face to face and telephone interviews. The users (firms in face to face interviews) were in the course of examining their adoption of cleaner technologies asked about sources, use, cost and effectiveness of information systems (in Workpackage 2). The importance of, and how these sources facilitate use of clean technologies were examined. The additional empirical focus here (Workpackage 3) was on interviews with the advisory sources themselves. In order to:

(i) identify types of firms where difficulties arise with achieving full effectiveness from advice or service,

(ii) identify gaps between manufacturer/client needs and demands for services,

(iii) identify role of public agencies or public sector providers (including educational establishments) in providing environmental services or referring firms to private sector suppliers,

(iv) to provide a further source of estimates of productivity and competitiveness effects,

(v) to determine the effect on the culture of firm,

(vi) the linkage effects between the input suppliers (i.e. machines, material, energy, water or packaging) and manufacturing (both positive and negative),

(vii) to examine pressures for environmental and competitiveness improvements arising from market sources, especially customers, and how manufacturers adjust to these pressures. The aim is to measure the relative importance of adjustment undertaken for regulation and for market reasons. An important focus of study will be the mechanism through which pressures and standards are exerted and monitored.

2.4 Analyses

National comparisons focused on within-country relationships between environmental initiatives and the set of hypothesised explanatory variables holding constant regulation, environmental costs, market revenue and enforcement.

3 Sampling and Empirical Background

3.1 Furniture Industry

On March 5, 1999 and April 26, 1999, 538 short questionnaires were sent out. As resources of addresses, business information publications (Hoppenstedt and Wer liefert was?) and the catalogues of the trade fairs Orgatec (International Trade Fair for Furnishing and Management of Offices and Office Facilities) and International Furniture Fair were used. Besides the questionnaire, every letter contained an opening note which explained the aims of the project plus an addressed and stamped envelope to make it as convenient as possible for the companies to return the (answered) questionnaire. Overall, a total number of 98 responses were received, which is a return rate of 18,22 %. Since 5 of these responses are related to companies with more than 500 employees, the postal questionnaire sample encompasses only 93 cases.

Between February 1999 and November 1999 in many parts of Germany 33 firms were visited. Interviewees were managers or owners of the small companies and environmental managers in bigger companies. Interviews lasted between 1 and 2 hours. Since one company turned out to be much bigger than expected, 32 cases could be used for evaluation.

The first thing to do in this section will be to have a look at the distribution of the sample firms on different size categories:

	postal questionnaire (PQ)		**face to face interviews (FTF)**	
Firm size	Number of firms	% of firms	Number of firms	% of firms
1-10	5	5,5	7	21,9
11-25	24	26,4	6	18,8
26-50	30	32,9	4	12,5
51-100	15	16,5	4	12,5
101-250	11	12,1	6	18,8
251-500	6	6,6	5	15,5
Total	91	100	32	100

Tab. 3.1: Firm Size Furniture

The FTF-firms had 137 employees in 1998 and a turnover of 16 mil. €. This was only a little bit above the sector average of 92 employees (1994) and 13 mil. € turnover (1996).

Overall, this distribution of firms is a good representation of the whole German furniture sector, which is a branch with a majority of smaller companies.

3.2 Textile Industry

On October 7, 1999, 681 short questionnaires were sent out. As sources of addresses, business information publications (Hoppenstedt, “Wer liefert was?” and “Das große Einkaufs 1 x 1 der Deutschen Wirtschaft”) and the internet database Branchen-Dino“ were used. Additionally to the questionnaire, every letter contained an opening note which ex-

plained the aims of the project plus a self-addressed, stamped envelope in order to make it as convenient as possible for the companies to return the (filled in) questionnaire. Altogether, only a number of 30 responses was received, which converts into a return rate of merely 4.41 %.

Containing a special letter which explained the importance of every single answer, 681 questionnaires were again sent to the same companies (on November 5, 1999, January 5, 2000 and March 31, 2000). And indeed, with 63 answers and a return rate of 9.68 % (calculated on the basis of 651 questionnaires) the second attempt clearly led to a better result than the first one. Hence, a total number of 93 answers was received overall, which is a return rate of 13.66 %. Since 20 of these responses are not applicable (especially because the firms do not belong to the finishing industry), the postal questionnaire sample only encompasses 73 cases. As these 681 addresses encompassed practically all known firms of the sector, the sample size could not be enlarged.

As for the face-to-face interviews, these were conducted between January and September 2000. The companies were first of all phoned to ask for the name of the environmental manager/production manager/general manager (in that order). After that, a letter explaining the aim of the research and the nature of the questions to be expected was faxed to this person. As a third and last step, the person was phoned to make an appointment, which about half of the persons finally reached agreed to. Most firms interviewed came from Lower Saxony, Rhineland-Palatia, Saxony and Northrine-Westfalia. Thus, a set of regions which should fairly well represent national differences within Germany was visited: Highly industrialised (Northrine-Westfalia), moderately industrialised (Lower Saxony, Rhineland-Palatia) and (compared to the East German average) highly industrialised Saxony. The interviews took between 1 and 2 hours. In some lengthy closed-end questions hand-out cards containing the answer categories were used to speed up the interviews, which proved to be useful.

	postal questionnaire (PQ)		**Face to face interviews (FTF)**	
Firm size	Number of firms	% of firms	Number of firms	% of firms
1-10	12	16,9	3	9,4
11-25	16	22,5	2	6,3
26-50	9	12,7	10	31,3
51-100	10	14,1	6	18,8
101-250	18	25,4	7	21,9
251-500	6	8,4	4	12,5
Total	71	100	32	100

Tab. 3.2: Firm Size Textile

The FTF-firms had on average 97 employees in 1999 and a turnover of 8.5M €. The 1994 figure of 136 employees is very close to the industry's 1994 average of 141employees per company. The mentioned turnover is also close to the 1996 average of 8.15M € turnover. Thus, the sample should fairly well represent the German textile industry.

3.3 Fruit- and Vegetable Sector

On October 25, 2000, 712 short questionnaires were sent out. As sources of addresses, business information publications (Hoppenstedt, “Wer liefert was?” and “Das große Einkaufs 1 x 1 der Deutschen Wirtschaft”) and the internet database Branchen-Dino“ were used. Additionally to the questionnaire, every letter contained an opening note which explained the aims of the project plus a self-addressed, stamped envelope in order to make it as convenient as possible for the companies to return the (filled in) questionnaire. Altogether, only 19 responses were received, which converts into a return rate of merely 2.7 %.

Containing a special letter which explained the importance of every single answer, 703 questionnaires were again sent to the same companies (on January 8, 2001). And indeed, with 71 answers and a return rate of 10.2 % (calculated on the basis of 693 questionnaires) the second attempt clearly led to a better result than the first one. Hence, a total number of 90 answers was received overall, which is a return rate of 12.6 %. To improve this number, on the basis of the postal questionnaire 18 telephone interviews were carried out, and that means that the sample finally encompasses 108 firms.

As for the face-to-face interviews, these were conducted between September 2000 and July 2001. The companies were first phoned to ask for the name of the environmental manager/production manager/general manager (in that order). After that, a letter explaining the aim of the research and the nature of the questions to be expected was faxed to this person. As a third and last step, the person was phoned to make an appointment, which about half of the persons finally agreed to. Most firms interviewed came from Lower Saxony (11), Rhineland-Palatia (6), Baden-Wuerttemberg (3) and Northrine-Westfalia (3). The interviews took between 1 and 2 hours. In some lengthy closed-end questions hand-out cards containing the answer categories were used to speed up the interviews, which proved to be useful.

	postal questionnaire (PQ)		**Face to face interviews (FTF)**	
Firm size in 1999	Number of firms	% of firms	Number of firms	% of firms
1-10	52	48.6	15	44.0
11-25	20	18.7	6	17.6
26-50	12	11.2	2	5.9
51-100	10	9.3	7	20.6
101-250	8	7.5	2	5.9
251-500	5	4.7	2	5.9
Total	107	100.0	34	100.0

Tab. 3.3: Firm Size Fruit and Vegetable

As for the postal sample, table 1 shows that in 1999 88.5 % of the companies of the sample had numbers of employees ranging from 1 to 50 people. 16.8 % of the firms employed 51 to 250 people, whereas only 4.7 % employed more than 250 workers. The observed firms employed 31 persons on average in 1993, and grew to 48 people in 1998. The sample was very much smaller than the industry average as taken from national statistics of 123 in 1994 and 109 in 1998.

The FTF-firms had on average 54 employees in 1999 and a turnover of 4.02 M €. The 1994 figure of 50 employees also is considerably lower than the industry's 1994 average of 123 employees per company. The interviewed firms are thus on average much smaller than the average firm.

In contrary to the average firm, which shrank by 11% in these five years, the FTF-firms grew 8% and the PQ-firms grew 55%. Our questions were answered by firms, which grew much more than the sectors average. Surprisingly this effect is stronger in the PQ sample.

4 The Situation of the individual Industries

4.1 The Furniture Industry in Germany

Although the German furniture industry is still by far the biggest in Europe (about 30% of production value of furniture in EU) the branch remained static the past years with a light tendency to shrink. The forecasts were quite pessimistic but the situation is supposed to change in the medium-range.

In Europe Germany follows it's hardest competitor Italy as the second largest exporter of furniture in the world but their is a trade gap for several years now.[1] This gap exists because labour intensive products are more and more imported from eastern Europe. This trade gap will remain until major changes concerning labour costs are taken by the German government.

In mill. Euro	1992	1993	1994	1995	1995	1998
Germany	18.447	18.906	18.746	19.765	19.064	20.294
Italy	10.843	9.465	9.855	10.290	11.416	12.733
UK	6.326	6.392	6.717	6.074	6.522	9.945
Ireland	210	198	229	280	319	358

Tab. 4.1: Furniture production in the EU. Source: GD III, C.E.I-Bois quoted in HDH (1998a and 1999)

Furniture industry in Germany includes all company sizes from small to large. Most employees are working in the many small and in the few big companies.

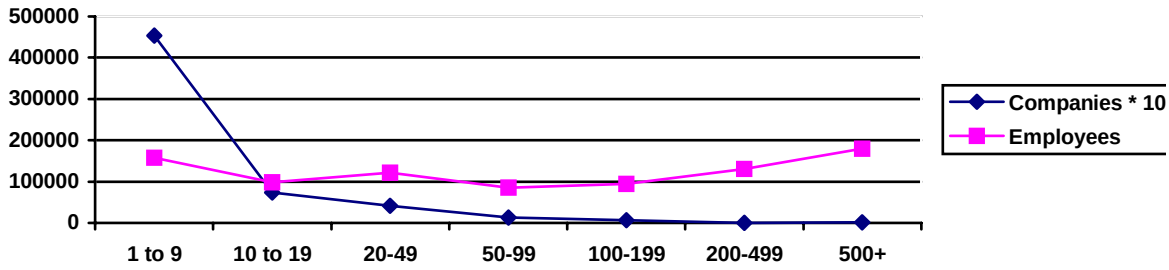


Fig. 4.1: Number of enterprises and employees in wood, furniture paper and printing 1990. Source: Unternehmensgrößenstatistik 1992/93

[1] all following data is taken from „Wichtige Branchendaten der deutschen Holz-, Moebel- und Kunststoffindustrie 1996/97" (HDH 1998a) as well as the same in the 1998/1999 edition (1999a) and from the annual report of the Hauptverband der Deutschen Holz und Kunststoffe verarbeitenden Industrie und verwandter Industriezweige e. V. 1996/97 (HDH 1998b) as well as the same in the 1998/1999 edition (1999b). Both brochures are available at the HDH.

The development within the last twenty years can be described using data from the respective German statistical yearbooks.

The production value remained largely constant between 1978 and 1988, there was a intensive boom of sales after the German reunification followed by a sales crisis.

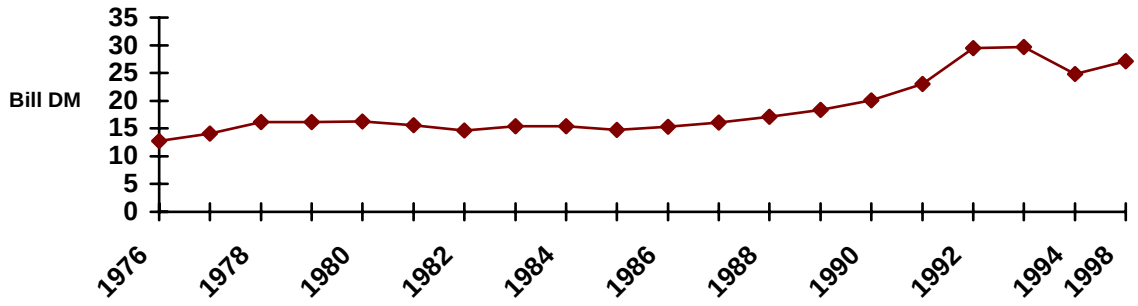


Fig. 4.2: Production value in furniture manufacturing 1976 – 1998. Source: Statistische Jahrbücher 1980, 1984, 1988, 1992, 1996, 2000

The number of employees and number of companies is only available for wood manufacturing industry, of which furniture industry forms about 75%.

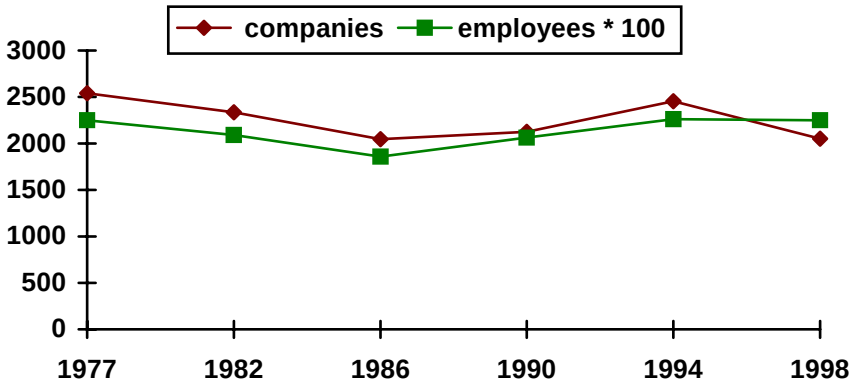


Fig. 4.3: Number of companies and employees in wood manufacturing 1977 – 1998
Source: Statistische Jahrbücher 1980, 1984, 1988, 1992, 1996, 2000

The sector did, within the first seventeen years, not show any major tendency of concentration. The average size of the company did only rise from 87 employees in 1977 to 92 in 1994 but then jumped to 110 within four years.

According to the report of HDH 2000/01, within wood manufacturing industry the furniture branch had 1418 companies in 2000. There is listed some detailed data for different furniture sectors and the whole sector in the table below:

2000	Turnover in bn €	Employees	number of companies
Seating furniture	7,29	46.720	325
Office and shop furniture	2,88	23.022	289
Kitchen furniture	3,91	22.595	138
Other furniture	7,85	64.003	606
mattresses	0,79	5.130	61
Furniture in total	22,73	161.469	1418

Tab. 4.2: Business Size and turnover of the Furniture Industry. Source: Statistisches Bundesamt quoted in HDH (2001)

The industry invested more than 3% of its turnover and in 1999, investments rose by 6.8%.

investments of the furniture industry in thsd. € in 1999	sites with buildings	technical equipment	Investment in total
seating furniture	27.256	129.114	157.813
office and shop furniture	*	86.239	103.775
kitchen furniture	*	92.756	112.937
other furniture	74.480	223.945	303.164
Matresses	1.364	22.933	24.298
Furniture in total	139.789	554.987	701.988

* Data not available or secret

Tab. 4.3: Investments of the Furniture Industry. Source: Statistisches Bundesamt quoted in HDH (2000)

The factory operation rate dropped from 85.9% in 1995 down to 80.9% in 1997 and rose to 84.1% in 2000. Labour intensive production has shifted to countries of Eastern Europe mainly to Poland because of the high labour costs in Germany. For this reason the money output of production has decreased more than the turnover. More and more companies produce less on their own but import furniture to sell them with their productions. According to this development the number of employees diminished continually since 1995.

2000	number of Employees	working hours in thousand
seating furniture	46.720	25.865
office and shop furniture	23.022	12.504
kitchen furniture	22.595	10.837
other furniture	64.003	36.750
Matresses	5.130	3.330
Furniture in total	161.469	65.880

Tab. 4.4: Employment in furniture industry. Source: Statistisches Bundesamt quoted in HDH 2000

2000	furniture industry
Gross wage bill in percentage of turnover	20.77%
Turnover per working hour	130.47 €
Gross wage bill per working hour	33.29 €
Working hours per worker per year	1529
Average turnover per employee	143.098 €
Average turnover per company	17.410.000 €
Average employees per company	122

Tab. 4.5: Wages and productivity in furniture industry. Source: Statistisches Bundesamt quoted in HDH 2000

Average equity capital ratio in the wood and furniture industry was only at 7.9% in 1994 which is almost the least of all industry sectors and it tends to diminish further due to low anticipated profits.

There are several reasons for the unsatisfactory development. The recovery of the construction industry and private consumption was not strong enough to have positive effect on furniture sales so far.

Furniture are durable goods and elasticity of demand is very low. Although exports have climbed again in German economy the furniture sector wasn't able to keep up with this development. Exports increased less in comparison to other industries.

There is also a strong concentration process between the large furniture retailers. This leads to the phenomenon that the amount of production has risen but the money output of production has decreased. Competition is getting stronger. So prices are under pressure and furniture companies are forced to produce low budget products and cancel production of more exclusive furniture to keep up with competition. For this reason small companies with an exclusive model line and no possibility to produce cheap products are especially threatened by this development.

4.1.1 Environmental regulation in the furniture industry

German environmental and environmental-related regulation impacts the furniture sector in a number of areas:

Area	Main items regulated
Organisation	People responsible for a number of tasks have to be appointed and their names given to the authority
Pollution prevention	Some plants have to be approved by the authority Certain levels of noise have to be met
Water protection	Water discarded into rivers or sewers has to meet some limits of substances contained Approvals are sometimes necessary Water hazardous liquids must be stored meeting certain demands
Waste	Waste must be reduced and disposed of meeting many regulation about separate collection, transport and final disposal There must be a yearly waste-report to the authority
Packaging	some Packaging must be taken back some packaging must be registered under the „green dot“ and payed for
Hazardous substances	Must be stored, documented, transported, used and disposed of meeting certain demands
Emergency preparedness	Fires have to be prevented and for the case of a fire, preparations have to be carried out
Energy	Buildings, heating systems and plants using more than a treshold amount of energy must meet detailed requirements of efficiency and emissions
Environmental liability	Very big coating plants (more than 25kg/h of VOC emissions) could be covered by the environmental liability law
Safety at work	Safety standards for many plants have to be met

Tab. 4.6: Environmental regulation in the furniture industry

A detailed list has been drawn up to gain overview about German regulations affecting furniture firms. As the list is only of importance for German firms, it is not documented here. This type of list is also used within the EMAS Scheme to get overview over environmental regulation and enforce compliance.

4.1.2 Environmental items of the furniture industry as seen by the sector association

There are several major topics concerning environmental aspects for the branch. One of these is the post consumer waste issue. The representing association called HDH (Hauptverband der deutschen Holz und Kunststoffe verarbeitenden Industrie und verwandter Industriezweige e.V) sees only few similarities between used furniture and other wastes and refuses to subscribe a take-back commitment. The reasons are the following: Furniture are durable goods and are often used for 25 years and more so there is the possibility that some manufacturers have quit business and new ones cannot be obliged to take back products they never produced. Besides that over 30% of furniture are imported. One third of old furniture are used by other people and the removal of bulk waste is well organised and established. A large share of bulk is taken to produce new chipboards and the thermic use to produce energy is CO_2 neutral.

Another item discussed is the carcinogenity of wood dust. Some kinds of dust such as from oak wood is regarded to be carcinogenic but there are also results of studies that dust from wood which has not been treated does not increase the risk of cancer. The HDH tries to get more detailed results which may lead to the elimination of some matters from the list of carcinogenic substances

To identify furniture which has a less environmental impact than similar products in its whole life cycle an ecology label is developed by the German Federal Environment Agency. This label poses demands on production, use, waste disposal of the furniture and its packaging and transport. Another important item is the usage of low solvent paints for coating. The Federal Environment Agency finds it easier to create this label only for Germany but the HDH requests one for Europe because this would be accepted by all important markets.

4.1.3 The future of the furniture industry in Germany

The near future appears a bit brighter to the furniture industry. The number of households will still be rising and there are many people between 25 and 50 years old who might need furniture for replacement and supplement. The domestic surrounding becomes more and more important to the people as a contrast to the hostile world outside.

As can be seen in the table below prices of raw material have dropped considerably while the price index of the products has climbed, so prices of raw materials are not a problem.

		1995 (1991=100)	2000 (1995=100)
Conifer wood	Index	95.9	94.9
Raw chipboards	Index	90.6	84.2
plated chipboards	Index	95.3	77.1

Tab. 4.7: Raw material prices. Source: Statistisches Bundesamt quoted in HDH 1998a and 2000

price index		1995 (1991=100)	2000 (1995=100)
Furniture in total	Index	113.3	108.5
	change in percent	+2.1	+2.1

Tab. 4.8: Sales prices in furniture industry. Source: Statistisches Bundesamt quoted in HDH 1998a and 2000

Furniture industry seems to give good chances to SME´s in future. Since there is no dominating style in design like in the past centuries there is need for a large variety of furniture for different lifestyles. The association of German wood and plastic processing industry remarks in their annual report that there is no general accepted furniture style because society doesn't try to copy the lifestyle of their monarchs anymore like in Victorian or Louis XV times. *"Although he is very powerful Helmut Kohl is not a King. Nobody who is into fashion acts according to Helmut Kohl and how his house in Oggersheim is equipped namely cosy and voluminous is not trendsetting."* (HDH 1998b). This will probably not change in the forthcoming Schröder-Era and therefore a variety of small firms will be able to cope in a very diverse market.

4.2 The Textile Industry in Germany

The German textile industry is still one of the biggest commodity industry sectors by turnover and numbers of employees. The production of textiles is spread all over the world with many international trade relations e.g. from a cotton plant in the United States to a spinner and weaver in Italy, a sewing factory in Korea and finally to a finishing company in Germany. For this reason the textile industry is very exposed to global competition.

Within the last twenty years, this process of globalisation had an intensive impact on the German textile industry. Many low qualified tasks are today done by contractors in low wage countries and the number of companies and employees is continuously declining.

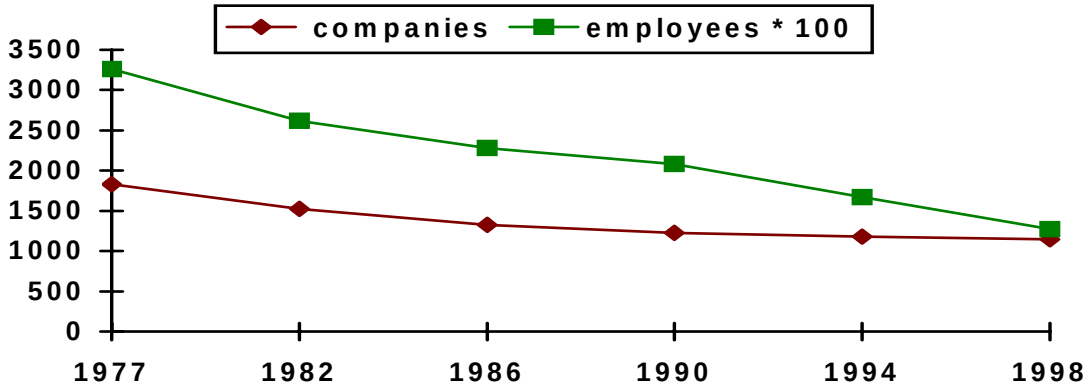


Fig. 4.4: Number of companies and employees in textile industry 1977 – 1998.
Source: Statistische Jahrbücher 1980, 1984, 1988, 1992, 1996, 2000

The average number of employees per company fell from 178 in 1977 down to 141 in 1994 and 110 in 1998.

Nevertheless the turnover of the industry as well as wage bill and investments kept rising until the beginning of 1990´th. The first half of the 1990´th it decreased and stabilised between 1994 and 1998.

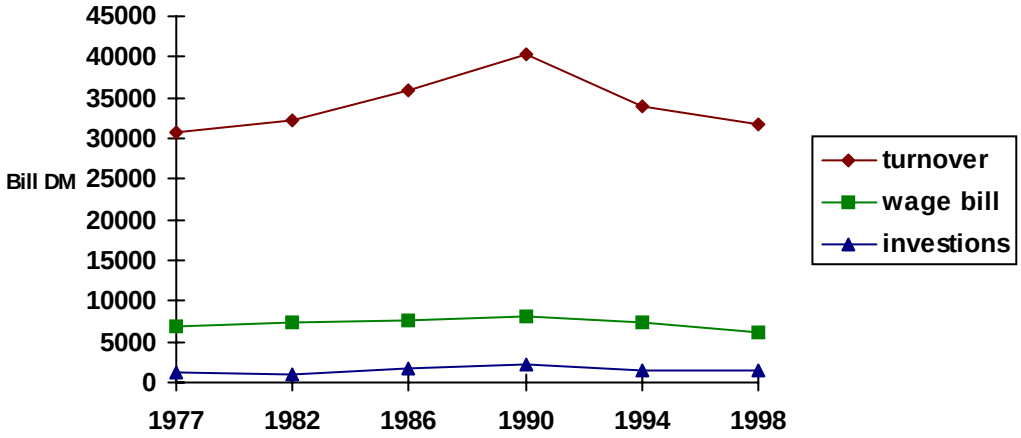


Fig. 4.5: Turnover, wage bill and investments in textile industry 1977 – 1994.
Source: Statistische Jahrbücher 1980, 1984, 1988, 1992, 1996, 2000

Although a major part of the demand for textiles is satisfied by imports of foreign countries it is still one of the most important consumer branches. 79% of all textiles on the home market are still produced in Germany.[2]

in bil. €	1990	1991	1992	1993	1994	1995*	1996**
Italy	27.4	28.3	27.2	24.2	25.0	31.0	31.9
Germany	20.1	21.2	20.4	19.0	17.2	19.2	18.5
GB	13.1	13.3	13.1	12.5	10.6	12.0	12.6
Ireland	0.6	0.6	0.7	0.6	0.6	0.8	0.8
EU in total	106.5	108.4	105.4	98.0	94.8	109.5	109.5

* changed procedure of capturing branch data ** temporary

Tab. 4.9: Turnover of the Textile Industry in the EU. Source: OETH, Brussels, quoted by Jahrbuch der Textilindustrie 1997

Due to the large amount of textile imports there is a huge difference between imports and exports. For example 90.7% of ready made clothing were imported in 1991. However this gap is slightly closing because foreign demand keeps rising.

1995	Export			Import		
	Textiles	Clothing	Total	Textile	clothing	Total
Italy	12794	14171	26964	6387	4650	11037
Germany	14213	7426	21639	12171	24275	36447
GB	5430	4314	9744	7300	8016	15316
Ireland	590	505	1095	594	842	1436

Tab. 4.10: Foreign Trade with Textiles and Clothing. Source: Jahrbuch der Textilindustrie 1997

The most important trade partners for export are the Netherlands, France, Italy and the UK. The most significant suppliers are Italy and China but also imports from countries of Eastern Europe have increased.

The textile industry was always a major topic when it came to discuss the unemployment problem and the high labour costs in Germany in the past. Its labour intensive production is a sensitive indicator for the employment situation of the whole economy. 1992 and 1993 were especially bad years with a weak export and home market. The industries employment diminished year after year and it still does but it seems that this is not a big problem for the textile industry anymore. The dropping employment rate is still blamed on high labour costs and there is still demand for reforms. So although employment indicators are bad the branch is not in a deep crisis. There is a permanent process of industrial re-engineering to increase production efficiency. This reduces the number of jobs for low qualified mainly female employees which form a share of employees of up to 46% in certain sub-branches. But it is not a hot spot for the branch in general.

[2]All following data is taken from „Jahrbuch der Textilindutrie 1995-1997“, Hrsg. Gesamttextil, Eschborn 1995-1997 and from the homepage of the textile industry association Gesamttextil, http://www.gesamttextil.de

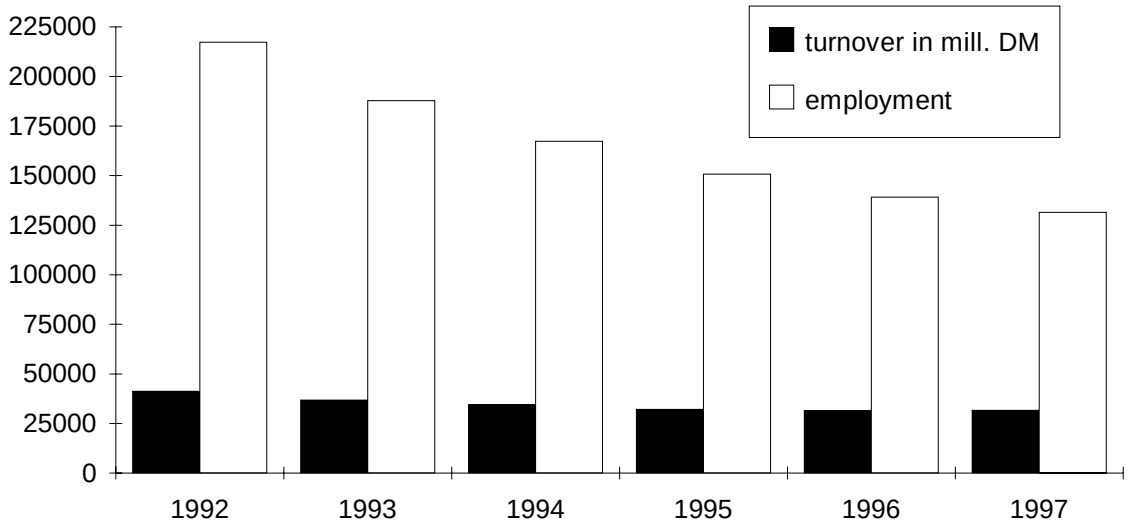


Fig. 4.6: Turnover and Employment in the Textile Industry. Source: Jahrbuch der Textilindustrie 1997

As can be seen in the table below the industry has many small companies.

Group size	numbers of companies	share in percent of total	employees	Share in percent of total	turnover (mil. DM)	share in percent of total
20-49	517	41.4	16584	11.3	2909	9.2
50-99	330	26.4	22956	15.7	4449	14.1
100-199	214	17.1	30084	20.5	6684	21.2
200-499	149	11.9	45674	31.1	10201	32.3
500-999	28	2.2	18762	12.8	4559	14.4
1000 and more	10	0.8	12602	8.6	2774	8.8
Total	1248	100.0	146662	100.0	31577	100.0

Tab. 4.11: Business Size and Employment in the Textile Industry without Clothing. Source: Jahrbuch der Textilindustrie 1997

The textile companies are mainly located in Northrhein-Westfalia (410 companies with 20 or more employees) Baden-Württemberg (309) and Bavaria (285). In these „Länder“ concentrate 70% of the whole German textile industry.

45% of the textile production in Germany are clothes. 30% are home textiles. 25% are so called technical textiles. These products are supposed to have the biggest growth in the future. The share of the production value of these technical textiles for filters or as a substitute for steel used in concrete is 33% of the produced value. Another advantage of these textiles is that the demand depends not on the unreliable private consumption. China and India are supposed to be future growing markets for these high tech textiles.

Although the Germans in 2000 spent 6.4% of an average monthly wage (135€) for clothing (HDH 2001), which is far more than in other industrialised countries, low private con-

sumption has become a permanent problem for the economy. Private households with greater income spend even more money for textiles (7.4% in 1994).

4.2.1 Environmental regulation in the textile industry

German environmental and environmental-related regulation impacts the textile dyeing and finishing sector in a number of areas:

Area	Main items regulated
Organisation	People responsible for a number of tasks have to be appointed and their names given to the authority
Pollution prevention	Some plants have to be approved by the authority
Water protection	Water discarded into rivers or sewers has to meet some limits of substances contained Approvals are sometimes necessary Water hazardous liquids must be stored meeting certain demands
Waste	Waste must be reduced and disposed of meeting many regulation about separate collection, transport and final disposal There must be a yearly waste-report to the authority
Packaging	some Packaging must be taken back some packaging must be registered under the „green dot“ and payed for
Hazardous substances	Must be stored, documented, transported, used and disposed of meeting certain demands
Emergency preparedness	Fires have to be prevented and for the case of a fire, preparations have to be carried out
Energy	Buildings, heating systems and plants using more than a treshold amount of energy must meet detailed requirements of efficiency and emissions
Environmental liability	Very big coating plants (more than 25kg/h of VOC emissions) could be covered by the environmental liability law
Safety at work	Safety standards for many plants have to be met

Tab. 4.12: Environmental regulation in the textile finishing industry

A detailed list has been drawn up to gain overview about German regulations affecting textile dyeing and finishing firms. As the list is in German, it is not documented in this report. This type of list is also used within the EMAS Scheme to get overview over environmental regulation and enforce compliance.

4.2.2 Environmental Aspects of the Textile Industry:

Clothing is not only a existential commodity but it is also a kind of status symbol to express personality. Because of fast changing fashion trends there are high material flows but recycling techniques are not developed properly. Producing textiles means to use a lot of different techniques and substances so the branch has big impact on the environment. For this reason integrated environmental protection e.g. by purchasing operating supplies

with less environmental impact and integrated production circles is an important and effective approach.

There were also several deficits discovered concerning environmental management systems. There is often a lack of environmental knowledge at the staff. Investments in environmental technologies are not properly supported. Responsibility is not clearly defined in the chain of production. Due to global production it is difficult to include suppliers world wide. The environmental technology development is also not sufficient. The industry remarked in its annual report in 1995 that there is only little know how concerning environmental questions and reporting systems because of the high number of small companies with only few human resources in this field.

Much water is needed for dyeing, rinsing and finishing textiles. For finishing textiles e.g. there is 200 m³ of water per ton of textile needed. The Jahrbuch der Textilindustrie 1995 mentions, that already in 1980 the costs for water, chemicals and energy were 50% of the total costs for wet finishing. Today this share has surely risen. According to that development reducing water and energy consumption are two important approaches to protect the environment but also an important economic aspect because it is a good possibility to save costs.

The high environmental standards in Germany have caused some financial loads especially for the finishing sub-branch of the industry which has lead to move production facilities to foreign countries with less restricted environmental laws. This shift and the vanishing textile industry in Eastern Germany are therefore the main reasons for the continuing reduction of energy consumption in the branch and only small effects are achieved by improvements of technology.

	coal	**Oil**	**coal gas**	**natural gas**	**electricity**
	t SKE	T	1000 m3	1000 m3	MWh
1992	559.435	265.613	23.836	739.295	5.036.680
1993	193.646	213.936	10.715	735.151	4.487.596
1994	148.451	179.441	8.796	709.689	4.344.475
1995*	162.844	157.687	10.706	590.466	3.631.160
1996	108.376	153.817	7.714	587.587	3.500.094

* changed procedure of capturing branch data

Tab. 4.13: Energy Consumption in the Textile Industry. Source: Jahrbuch der Textilindustrie 1997

The association of the German textile industry “Gesamttextil” has joined the industry's covenant of reducing the greenhouse gas CO_2. It looks like the branch will not miss the aim of reducing 20 % of CO_2 emissions in 2010. However this reduction is mainly reached by moving production capacities to foreign countries. So CO_2 is reduced in Germany but probably increased in the world because of less restrictive environmental laws at the new locations.

There is some research activity to solve these problems e.g. there is the possibility to substitute water through CO_2 for certain finishing processes.

Textiles can be reclycled by tearing rags to fibres and use this fibres to produce new textiles. These technology is to be developed further by research.

4.2.3 The Future of the Textile Industry in Germany

There is a research department on association level to develop and provide new products and technologies for small enterprises whose human resources are limited. Research activities also take place in environmental protection especially in textile-filters and textiles for noise reduction.

Future markets are not located in Western Europe anymore so the textile industry moves a considerable part of its production to foreign continents where market demand is rising and labour costs are low. The shift of production capacity has already reached a high level. Currently there are 63000 people working for the German textile industry in foreign countries.

As can be seen in the table below the investment ratio of the textile industry for Germany has dropped since 1990. This is another indicator that the branch sees its fortune in foreign countries.

	in mill. DM	per employee	investment ratio
1991	2300	8144	5.3%
1992	1890	8697	4.6%
1993	1570	8356	4.3%
1994	1490	8304	4.3%
1995	1200	7961	3.7%

Tab. 4.14: Investment in the Textile Industry. Source: Jahrbuch der Textilindustrie 1997

It seems that the textile industry will stay an impotant part of the German economy but with a fading importance for the labour market.

4.3 The Fruit- and Vegetable Processing Industry in Germany

The Fruit- and Vegetable Processing Industry is part of the food industry. Of the total of food industry fruit- and vegetable processing accounted in 1997 for about 5,7% of the turnover, 5,7% of the employees and 7,3% of the production sites[3].

Information on the long time development of the sector can be drawn from the national statistics, which is available for the whole sector of food industry. It shows, that food production is a stable industry, in which concentration is limited, the average number of employees is not very high and turnover, wage bill and investments keep rising over the years.

[3] Information by Bundesverband der obst-, gemüse- und kartoffelverarbeitenden Industrie e.V. of August 4th 1998

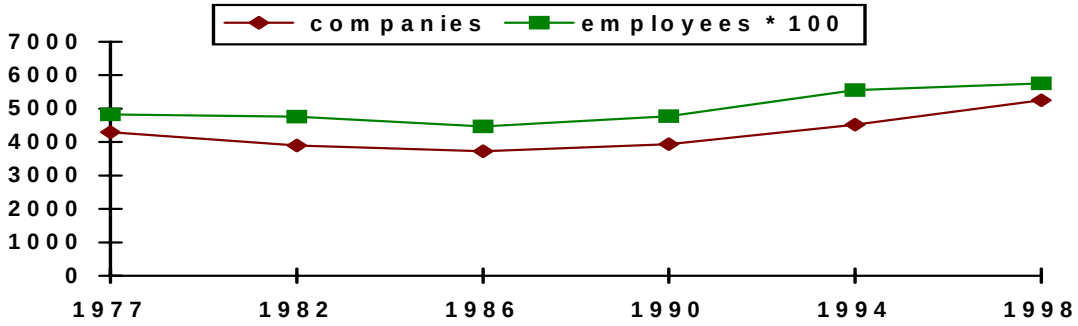
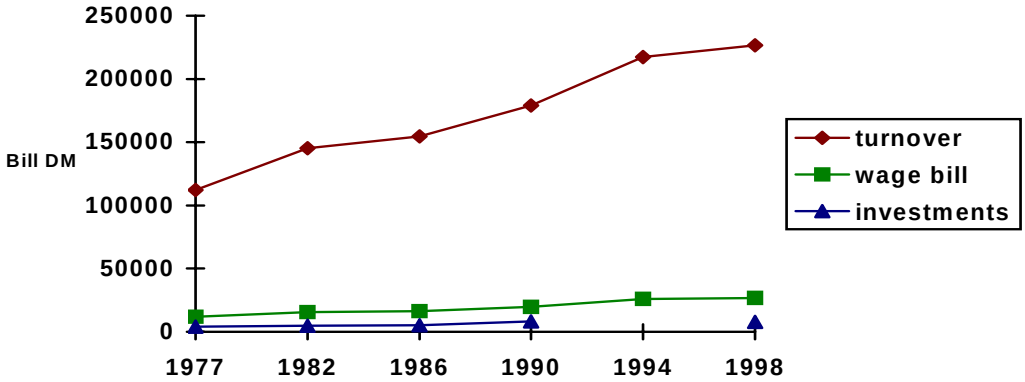


Fig. 4.7: Number of companies and employees in food industry 1977 – 1998. Source: Statistische Jahrbücher 1980, 1984, 1988, 1992, 1996, 2000

The average number of employees per company has slightly mounted from 113 in 1977 up to 123 in 1994, but decreased to 109 until 1998.

The turnover of the industry has exactly doubled (factor 2,02) within these 21 years, the wage bill mounted a bit faster by a factor of 2,22 and investments kept rising until the beginning of 1990´th, when they were twice as high as 1977. In 1994 they were not published by the Statistisches Bundesamt due to secrecy demands by industry. In 1998 they were slightly lower than in 1990.

Fig. 4.8: Turnover, wage bill and investments in food industry 1977 – 1998. Source: Statistische



Jahrbücher 1980, 1984, 1988, 1992, 1996, 2000

Fruit- and vegetable processing devides itself in three subsectors: Fruit- and vegetable processing, fruitjuice and potato processing. In the last five years, the fruitjuice business specially flourished quite well while the other two remained stable. Development of turnover and employment both show this tendency.

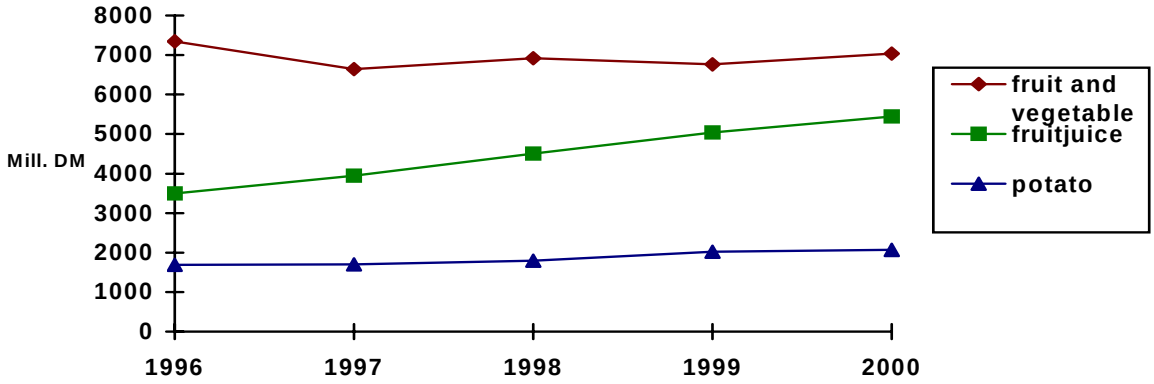


Fig. 4.9: Turnover in fruit- and vegetable processing, fruitjuice and potato processing 1996 – 2000 Source: Jahresbericht 2000/2001 of Bundesverband der Obst-, Gemüse- und Kartoffelverarbeitenden Industrie, Bonn 2001

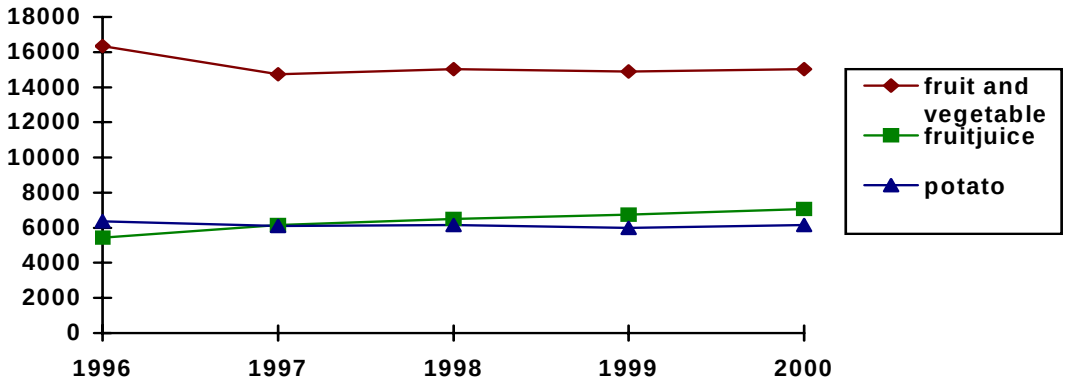


Fig. 4.10: Employment in fruit- and vegetable processing, fruitjuice and potato processing 1996-2000 Source: Jahresbericht 2000/2001 of Bundesverband der Obst-, Gemüse- und Kartoffelverarbeitenden Industrie, Bonn 2001

In export, fruitjuice performs much better. The export quota of about 18% is considerably higher than for fruit and vegetable products of potatoes (10-12%).

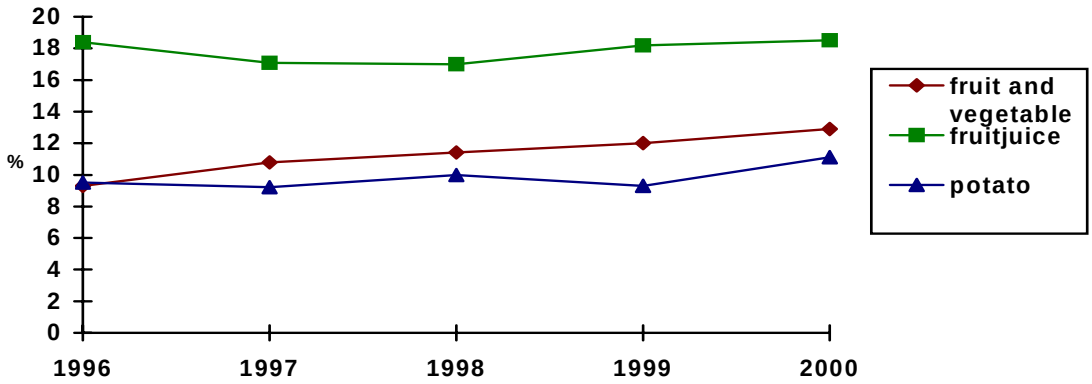


Fig. 4.11: Export quota in fruit- and vegetable processing, fruitjuice and potato processing 1996-

2000 Source: Jahresbericht 2000/2001 of Bundesverband der
Obst-, Gemüse- und Kartoffelverarbeitenden Industrie, Bonn 2001

As can be seen in the table below the industry has many small companies.

Turnover (million DM)	number of companies 1992	turnover 1992 (million DM)	turnover cumulated 1992 (%)	number of companies 1994	turnover 1994 (million DM)	turnover cumulated 1994 (%)
-0,05	42	1,6	0,0	44	1,6	0,0
-0,1	67	4,9	0,0	62	4,5	0,1
-0,25	85	14,3	0,3	109	18,1	0,2
-0,5	89	32,2	0,7	94	34,1	0,6
-1	94	68,5	1,6	100	72,7	1,3
-2	93	133,0	3,3	104	146,2	2,8
-5	90	295,5	7,0	96	313,5	5,9
-10	59	409,6	12,3	73	513,3	11,0
-25	50	798,7	22,5	69	1229,9	22,3
-50	29	1045,3	35,8	37	1322,1	35,5
-100	13	892,2	47,2	17	1220,2	47,7
-250	7	954,6	59,4	9	1250,2	60,2
Over 250	6	3185,7	100,0	8	3973,6	100,0
Total	724	7836,1	100,0	822	10100,0	100,0

Tab. 4.15: Business Size and Turnover in the Fruit- and Vegetable Processing Industry. Source: ZMP Bilanz Obst 1997

4.3.1 The Fruitjuice Sector

Some more information is available in the fruitjuice sector since the branch association is more transparent and publishes more information.

turnover (million DM)	number of companies 1997	number in (%)	turnover 1997 (million DM)	turnover 1997 in (%)
-0,5	52	26,1	12	0,2
-1	24	12,1	18	0,4
-2	31	15,6	45	0,9
-5	27	13,6	94	1,9
-10	18	9,0	126	2,6
-20	9	4,5	135	2,7
-50	22	11,1	695	14,1
-100	5	2,5	330	6,7
-200	5	2,5	782	15,8
Over 200	6	3,0	2699	54,7
Total	**199**	**100,0**	**4936**	**100,0**

Tab. 4.16: Business Size and Turnover in the Fruitjuice Industrie. Source: Verband der deutschen Fruchtsaft-Industrie e.V. (VdF), Bonn 1998

In the fruitjuice sector there is also some data on regional distribution of the companies. The most important regions are Hamburg/ Schleswig-Holstein/ Bremen/ Niedersachsen with 26,8% of the turnover, Northrhine-Westfalia (26,3%), Reinland Pfalz/ Saarland (18%) and Baden-Württemberg (13,4%).

The actual business situation in fruitjuice production is seen quite positive by the sector. The consumption of fruitjuice is rising constantly since 1950, when 1,9l/capita were bought in the market and much more will probably have been privately produced and consumed outside the market economy. Industrial production of fruitjuice rose over 6,1 l/capita in 1960, 9,9 l/capita in 1970 and 19,4 l/capita in 1980 and then jumped to 39,6 l/capita in 1990. In parallel, it can be assumed that private production in subsistence fell constantly.

The consumption of fruitjuice per capita has now risen to 40,6 l/capita in 2000 in Germany, which is the worlds highest consumption and ist followed by Austria (37,8 l), the USA (30 l), Swizzerland (30 l), the Netherlands and Finnland. Ireland follows at the 14th position with 11,7 l and Italy at 15th position with 9,5 l.

The turnover of the industry grew by 2,4% in 2000 and specially the east German region contributed with a high growth rate. Since 1990, east German production grew to the five-fold amount.

Sort of juice	Consumption 1997 in l	Consumption 2000
Apple	12,8	12,1
Orange	10,4	9,5
Multi-vitamin	2,9	
Grape	1,2	

Tab. 4.17: Ranking of the consumed juice-sorts. Source: Daten und Fakten der deutschen Fruchtsaft-Industrie e.V. (VdF), Bonn 1997/ 2000

The proportion of 100% fruitjuice has risen to 28,6 l/ capita while nectars (50% fruit-content) fell to 12,8 l/capita.

About 45% of fruitjuice production are packed in multi-way bottles, 16% are packed in one-way bottles and 39% in one-way containers, most of it probably the tetrapack-type.

4.3.2 Environmental regulation in the fruit- and vegetable processing industry

German environmental and environmental-related regulation impacts the fruit- and vegetable processing sector in a number of areas:

Area	Main items regulated
Water protection	Water discarded into rivers or sewers has to meet some limits of substances contained Approvals are sometimes necessary Water hazardous liquides must be stored meeting certain demands
Waste	Waste must be reduced and disposed of meeting many regulation about separate collection, transport and final disposal There must be a yearly waste-report to the authority
Packaging	some Packaging must be taken back some packaging must be registered under the „green dot“ and payed for
Hazardous substances	Must be stored, documented, transported, used and disposed of meeting certain demands
Emergency preparedness	Fires have to be prevented and for the case of a fire, preparations have to be carried out
Energy	Buildings, heating systems and plants using more than a treshold amount of energy must meet detailed requirements of efficiency and emissions
Organisation	People responsible for a number of tasks have to be appointed and their names given to the authority
Safety at work	Safety standards for many plants have to be met

Tab. 4.18: Environmental regulation in fruit and vegetable processing

A detailed list has been drawn up to gain overview about German regulations affecting fruit- and vegetable processing firms. As the list is only of importance for German firms, it is not documented here. This type of list is also used within the EMAS Scheme to get overview over environmental regulation and enforce compliance.

4.3.3 Integrated Environmental Protection in the Food Industry: The VDI-Study

A recent research has been done by the VDI (association of German engineers) to assess the state of production- and product-integrated environmental protection in four sectors, one of which was food industry. The study includes 294 answered questionnaires and was finished in December 1997.

A number of results of this study are of relevance for the ongoing research.

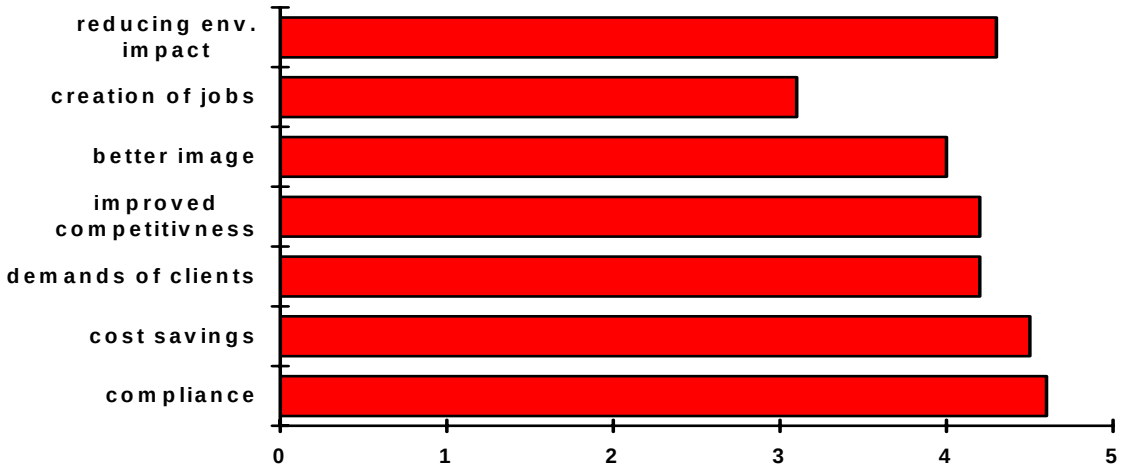


Fig. 4.12: Motivation to start environmental initiatives in the food sector measured on a one to five scale. Source: VDI (Hrsg.): Produkt- und Produktionsintegrierter Umweltschutz in der Nahrungsmittel- und Getränkeindustrie, Düsseldorf 1997

Of the firms with more than 10 million DM turnover per year 40% have an environmental officer and about 10% an EMS, over 100 million DM its 54% with an officer and 15% with an EMS.

Firms employ external consultants for a number of tasks.

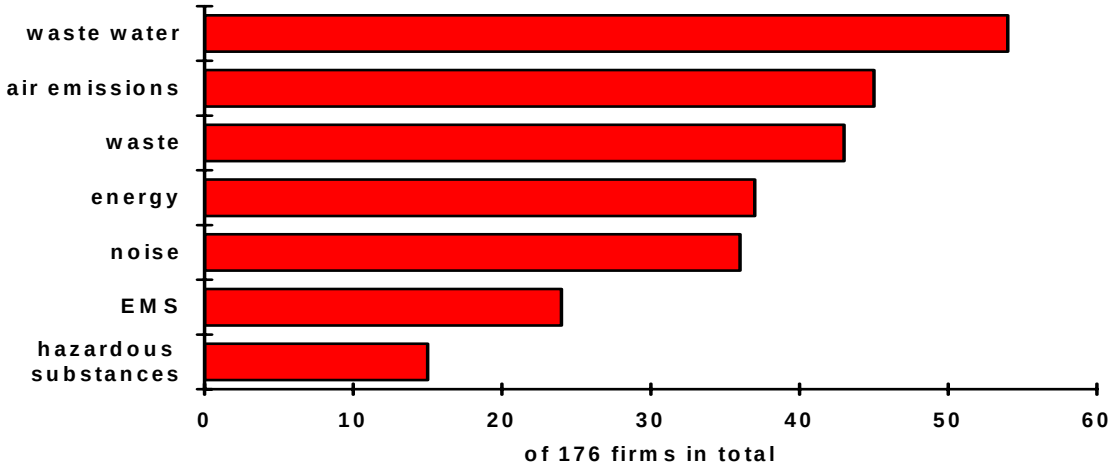


Fig. 4.13: External help in environmental protection. Source: VDI 1997

The second part of the questionnaire asked companies about environmental initiatives which were carried out in the last three years and which are planned for the next three years. I personally think that this question is quite valuable, but I have doubts about the relevance in detail since the questions were identical for very different sectors (chemistry, building trade, food, electronics) which made it hard for some sectors to recognize their aspects correctly in the written questionnaire.

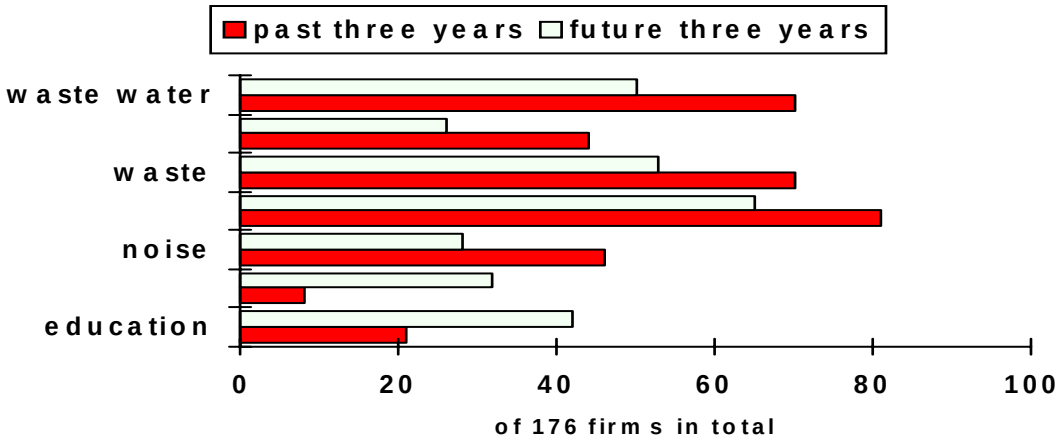


Fig. 4.14: Environmental initiatives in the past and the future 3 years (source: VDI 1997)

The results show, that technical environmental protection (waste, energy, water and wastewater) will remain most important. Management related initiatives will become much more important. Many companies in all four sector talk a lot about educating employees, but other evidence makes it possible to assume, that they are only talking and there will be no major action in education.

The main areas in which environmental targets are set are waste, wastewater and energy. In a small telefone survey carried out by IÖW in 1996 ten companies answered to the question „Why are you setting these targets?“ with a clear statement that this kind of measures clearly pay (Clausen et.al. 1997).

According to the VDI study, 69,9% of the food producers observe environmental aspects when purchasing raw material. 35,2% of the firms use a „red list“ in purchasing to avoid the procurement of goods, that are on the „red list“.

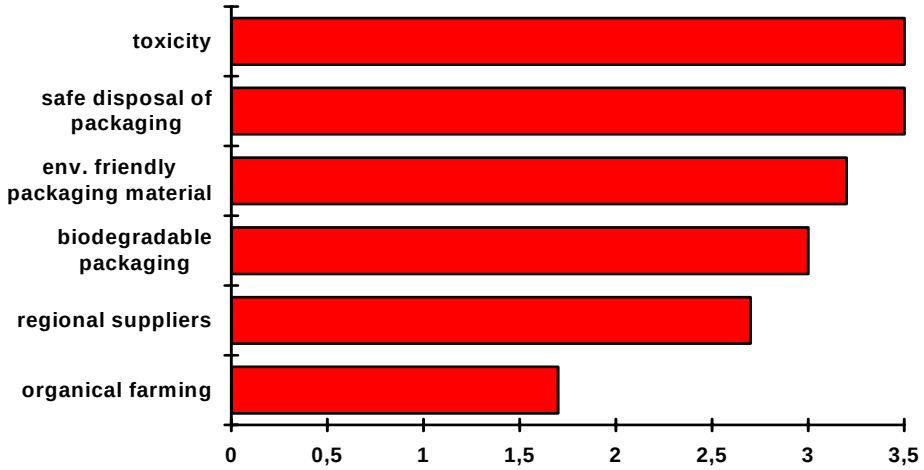


Fig. 4.15: Importance of certain environmental aspects in procurement measured on a one to five scale (source: VDI 1997)

The aspects mentioned show, that while the most important aspect „toxicity“ refers to the healthiness of the products, to the problem of allergic people etc., the three following as-

pects deal with packaging - and insofar not really with the product as such. „Regional suppliers“ and „organic farming“ again refer to the food raw material and rank last.

Deeper analysis showed, that specially the big firms (over 25 million EURO turnover) think, that organic farming is not important. But also 60% of the firms with 5 to 25 million EURO turnover ranked this aspect with 4 or 5. Big firms also do not concentrate on regional suppliers while smaller firms do.

In product development, a set of aspects seem to influence the future of food production:

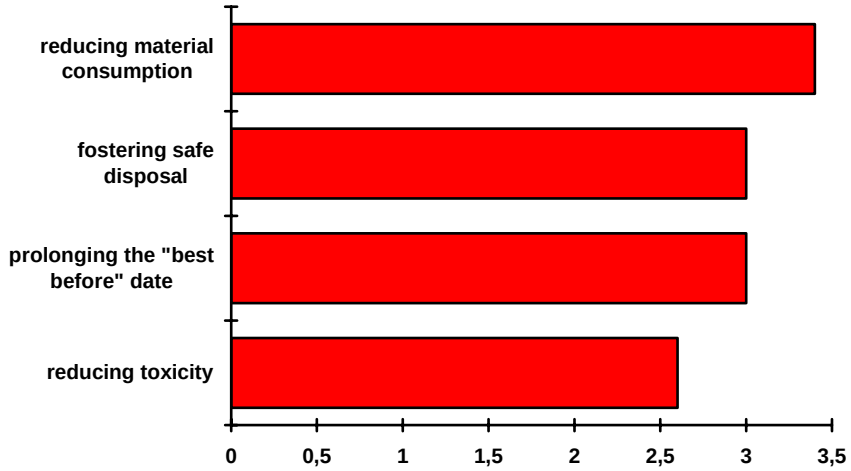


Fig. 4.16: Importance of certain environmental aspects in product development measured on a one to five scale (source: VDI 1997)

Good preservation of food is seen as an important aspect also by the Hoechst-Öko-Institut project „Hoechst Sustainable“, which dealt with the preserving agent „sorbin acid“, since it reduces spoilage of products (Öko-Institut 1998 and Ebinger et. al. in: Hitchens,Clausen, Fichter 1999).

The low rank for toxicity may mean, that many companies consider this problem as „nearly solved“.

4.3.4 The Future of the Food Industry in Germany

Looking on the constant development shown in figure 1, the future of food consumption and production may remain stable.

An important tendency in the market is convenience food, which is prepared and preserved „ready to use“.

One of the long time tendencies in food production also seems to be organic farming and food production. It still accounts only for a small quantity of the production. But is growing constantly over the years.

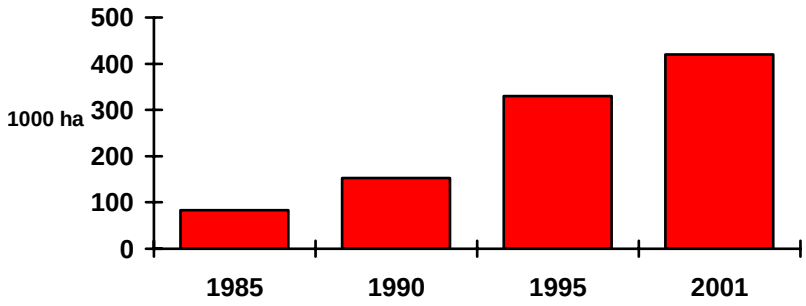


Fig. 4.17: Ecological farming in Germany - total area (source: Ökologie & Landbau 2/2001)

Not only that more and more smaller firms, as shown in text and figure 6, see organic farming as important. In 2001 organic food is being sold in nearly two thirds of the German supermarkets with a growing product range. One of the typical products sold in these supermarkets is frozen organic vegetables. And the red-green government has started fostering this tendency specially in succession of the BSE-crisis.

Within the Agenda 21 schemes there is also a tendency to redevelop regional marketing and direct marketing of agricultural products. A large number of „farmers markets“ mushroomed in hundreds of cities and about a third of the organic farmed products is being sold directly from the farmer to the consumer leaving food industry as well as supermarkets out of business.

5 Findings for Furniture Industry

5.1 Environmental Initiatives

The 93 PQ-companies, from a list of 11 detailed initiatives, mentioned a total of 329 initiatives. The average number of initiatives per firm therefore is 3.54. Only 6 firms have not adopted any initiative at all and nearly one quarter of the 93 companies have been carrying out more than 4 initiatives.

32 FTF-companies, within a framework of 8 types of initiatives, mentioned 172 initiatives which is an average of 5.38. There was no company in the FTF with less than 3 initiatives.

	PQ (max. 11)			**FTF (max. 8)**		
No. of initiatives	% of firms	No. of firms	Total no. of initiatives	% of firms	No. of firms	Total no. of initiatives
0	6.4	6	0	0	0	0
1	8.6	8	8	0	0	0
2	14.0	13	26	0	0	0
3	18.3	17	51	9.4	3	9
4	28.0	26	104	25	8	32
5	10.8	10	50	25	8	40
6	7.5	7	42	12.5	4	24
7	3.2	3	21	15.6	5	35
8	2.1	2	16	12.5	4	32
9	-	-	-			
10	-	-	-			
11	1.1	1	11			
Total	**100.0**	**93**	**329**	**100**	**32**	**172**

Tab. 5.1: Number of Environmental Initiatives

The degree of diffusion of the single types of initiatives differ a lot (see table 5.2). Waste separation is almost ubiquitous, and even with respect to wood-burning boilers and formaldehyde-free chipboard a widespread usage can be stated. With environmental report, eco-design and environmental management on the lower side of the scale, one will find more organisationally than technically oriented types of initiatives. Of great interest now is the question concerning the factors cited by the companies to be the drivers behind all these measures.

The most important fact discovered may be, that only five of 11 initiatives are mainly driven by one reason. Three times this is cost and two times it is market. Only cost and market seem to be able to serve as a single reason for action. Although regulation is also an important reason, it strikes that it is always coupled to market or cost reasons, which in all three cases rank nearly as high as regulation.

Only two kinds of initiatives were carried out for health and safety reasons, once together with market and once together with regulation.

The main result of the answers may be, that reality is more complex than can be shown in a one reason/ one result picture. Most initiatives are caused by at least two important drivers and the systems of driving forces are, for each initiative, differently interrelated. This may have the meaning, that policy has to take into account the complexity of "real life" if it wants to initiate initiatives in companies. Possible synergies between the driving forces market, cost, regulation and safety&health have to be considered and made use of.

Initiative	**Number of firms**	**% of firms**	**Main reason** (bold letters if dominant)	**Driver (%) if over 20%**
Waste separation	73	78.5	Regulation	Reg. 59%, Cost 37%
Wood-burning boilers	47	50.5	Cost	Cost 87%, Reg. 23%
Formaldehyde-free chipboard	44	47.3	Regulation	Reg. 59%, Market 57%, H&S 34%
Solid wood	37	39.8	Market	Market 82%, H&S 26%
Reusable packaging	32	34.4	Cost	Cost 63%, Market 28%
Water-based or powder coating	26	28.0	Health& Safety	H&S 46%, Market 31%
Solvent reduction	19	20.4	Health& Safety	H&S 47%, Reg. 42%
Environmental report	15	16.1	Regulation	Reg. 53% Market 47%
Eco-Design	14	15.0	Market	Market 100%, H&S 21%
Environmental management	13	14.0	Market	Market 62%, H&S 38%
Lightweight cardboard	9	9.7	Cost	Cost 78%

Tab. 5.2: Kind of Initiative and Main Reasons (PQ)[4]

Concerning the influence of the four drivers, by counting how often each factor was mentioned one can draw nearly the same picture as above: regulation was cited 116 times as a reason for an initiative, market 115 times and cost 109 times. Only health and safety, which was mentioned 74 times as reason, ranks lower.

To build a basis for cross tabulating the environmental performance of firms with other factors it is necessary to rank the firms according to their environmental performance. The idea is to form the three groups **compliance** (0 - 2 initiatives), **compliance plus** (3 - 5 initiatives) and **excellence** (6 - 11 initiatives).

[4] Added percentages may be higher than 100 since many firms mention more than one driver per initiative.

Rank	Number of firms	% of firms	average number of initiatives
Compliance	27	29.0	1,26
Compliance plus	53	57.0	3,87
Excellence	13	14.0	6,92
Total	93	100.0	3,54

Tab. 5.3: Environmental Performance Ranking (PQ)

We have now three groups but is not clear a priori, that the character of these groups really represents the idea behind their names.

The figure shows, which initiatives are carried out by the firms in each group.

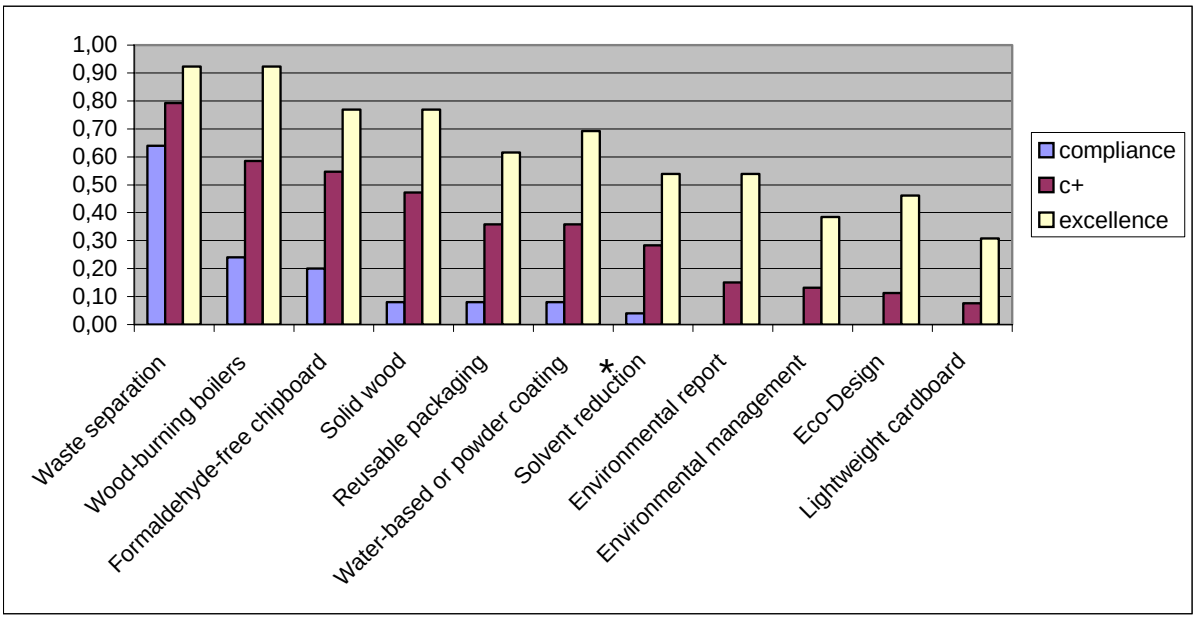


Fig. 5.1: Initiatives carried out by the performance groups (PQ)

It is impressive to see the concentration on just a few initiatives in the compliance group. 47% of all initiatives of this group are waste separation while only 13% of the excellence-groups initiatives are waste separation.

While the most important difference between the compliance and the compliance+ group are simply the number of initiatives, the main difference between the excellence group and the compliance+ group are the management related initiatives. While the compliance+ firms carry out 89,8% technical measures and 10,2% management related measures (EMS, eco-design, reporting), these initiatives form 20% of the activities of the excellence group. About half of the excellent companies have implemented these three measures while only about 10% to 15% compliance+ firms execute these instruments.

The three groups may therefore be considered as a useful model.

Initiative	Sales		Costs		Profits		Labour	
	Up	Down	Up	Down	Up	Down	Up	Down
Wood-burning boilers	-	3	8	27	16	7	8	5
Solid wood	18	1	21	-	11	6	10	1
Eco-Design	8	-	5	-	3	2	6	-
Lightweight cardboard	-	-	4	4	4	3	2	1
Reusable packaging	7	1	9	16	6	7	7	6
Solvent reduction	3	-	5	3	3	3	6	-
Environmental management	4	-	7	-	1	3	5	-
Water-based or powder coating	9	-	12	4	6	11	8	3
Formaldehyde-free chipboard	15	-	20	2	3	11	4	-
Environmental report	-	-	7	-	-	4	6	-
Waste separation	2	2	29	15	4	17	34	1
Total	66	7	127	71	57	74	96	17

Tab. 5.4: Economic Impact of Environmental Initiatives (PQ)

It is very clear that environmental initiatives increase labour on the shop floor level (e.g. waste separation) as well as in management (e.g. EMS). While in 96 cases labour is reported to go up only 17 cases report labour down. Only four types of initiatives are dominated by positive effects on profits. Overall, 57 cases of profits going up stand against 74 cases of profits going down. It may also be interesting, that 29 companies report higher cost due to waste separation while 15 report cost to be lower.

Labour, invested in environmental initiatives, does obviously not lead to higher profits in each case. There must be either management capabilities or external restrictions which make it possible, to turn the environmental initiative into a business success.

The most positive economic impacts can be seen in the case of wood-burning boilers, solid wood and eco-design. In the case of boilers lower costs and higher profits are closely connected, solid wood and eco-design caused higher costs but improved sales and profitability.

Win-win-effects may also be connected with lightweight cardboard, reusable packaging and solvent reduction. But these and all the other initiatives are not profitable “in themselves”.

It is an interesting fact, that the single initiative which has a (marketing) character of external communication (the environmental report) is seen as an economic disaster. While the driving forces are given to be regulation (53% obviously in the light of the environmental statement contained in EMAS) and market (47%) one could expect a positive market outcome. But we face a complete disaster: No influence on sales, higher cost, much labour and profits down. We may conclude, that German furniture companies treat EMAS as a regulation and not, as would be appropriate, as a chance for better market communication. The alternative conclusion would be, that the EU and the German government did not make the appropriate public relations efforts for EMAS which, subsequently, is unknown to most clients and has no positive market effect.

It is an even more interesting fact, that the result of the FTF is the exact opposite.

In the face to face interviews many more indicators of environmental performance have been collected. A ranking has been constructed[5] in which each company could score 12 points by the number of process initiatives and process-data collection (What gets measured, gets done!), 7 points by product related initiatives and 9 points by environmental management. If ranked according to this scheme, the distribution of initiatives is quite similar within the groups of the FTF and the PQ.

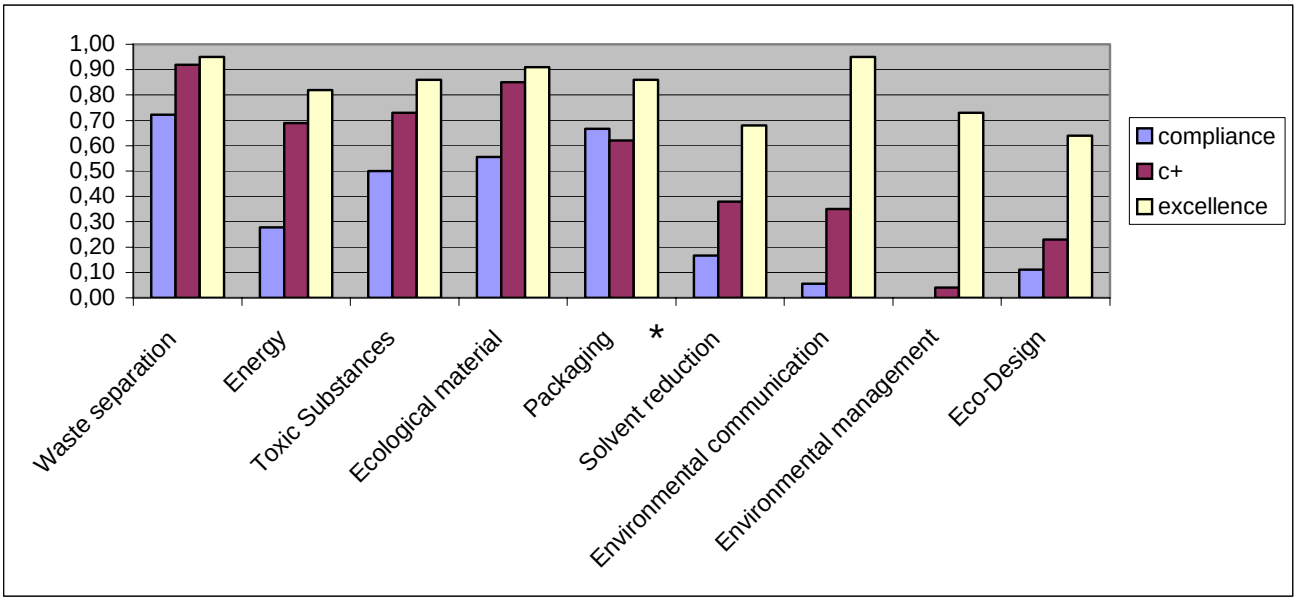


Fig. 5.2: Initiatives carried out by the performance groups (FTF)

Again we can see, that compliance+ firms implement many more technical initiatives and the step to excellence has much to do with the “soft instruments”.

It is interesting, that the highly cost efficient initiatives in energy management are often not carried out in compliance firms. Could government help them being more efficient by regulations?

It is also interesting, that the phasing out of toxic substances and the choice of ecological materials, often wood, are common in a lot of firms. But only excellent firms call this an “eco-design-scheme”, communicate about it and, probably, spent some thoughts about theory.

[5] Ranking scheme see chapter 2.1.1

Initiative	Number of firms	% of firms	Main reasons	Reasons (%) if over 20%
Waste separation	32	100	Regulation	Reg. 50%, Cost 28%
Reducing toxic raw material by natural materials	31	97	Market	Market 74%
Energy efficiency, wood-burning boilers	26	81	Cost	Cost 73%
Reusable or env. opt. packaging	26	81	Cost	Cost 43%, Market 23%
Solvent reduction	18	55	Market	Market 33%, H&S 22%
Environmental communication	17	52	Market	Market 65%
Environmental management	13	41	Market	Market 69%
Eco-Design	13	41	Market	Market 85%

Tab. 5.5: Kind of Initiative and Main Reasons (FTF)

It is striking, that FTF-firms more often see market as the driver of initiatives.

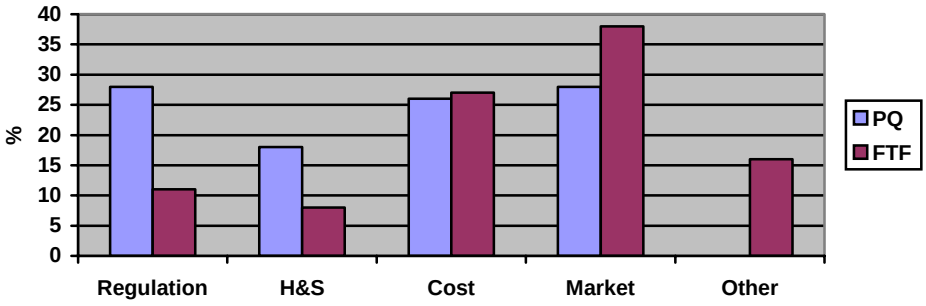


Fig. 5.3: Relative importance of drivers in PQ and FTF

Although in the FTF there was the possibility of “other” drivers, the dominance of market and cost as drivers for all initiatives is clear.

	Labour		Cost		Price		Sales		Position		Compet.		Profit		Image		
	up	don	bet	wor	bet	wor	bet	wor	bet	wor	bet	wor	bet	wor	bet	wor	
Waste separation			**7**	**7**		**7**		2		2	3	2	3	4	2		**39**
Energy efficiency, wood-burning boilers	2		**9**		4		3		3		**5**		**7**		2		**35**
Reducing toxic raw material by natural materials	1			2	2	2	3		4		**5**		1	1	4		**25**
Reusable or env. opt. Packaging	2		4	1	2		2		3		3		3	1	4		**25**
Solvent reduction	1		4	1	1	1	2		3		**7**		2		**5**		**27**
Environmental communication	2		1	3	1	1	3		**5**		**8**		4	1	**11**		**40**
Environmental management	1		1				1		4		4		1		**6**		**18**
Eco-Design	3		1	2	1	1	3	1	4		**6**		3		**6**		**31**
Total	**12**	**0**	**27**	**16**	**11**	**12**	**17**	**3**	**26**	**2**	**41**	**2**	**24**	**7**	**40**	**0**	**240**

Tab. 5.6: Economic Impact of Environmental Initiatives (FTF)

Only 240 “better” or “worse” weightings were made, but 1416[6] would have been possible. Considering the fact, that the interviewees gave “better” or “worse” weightings only in 1 out of 6 cases, we feel that the interviewees mentioned an economic impact only in cases of relevance.

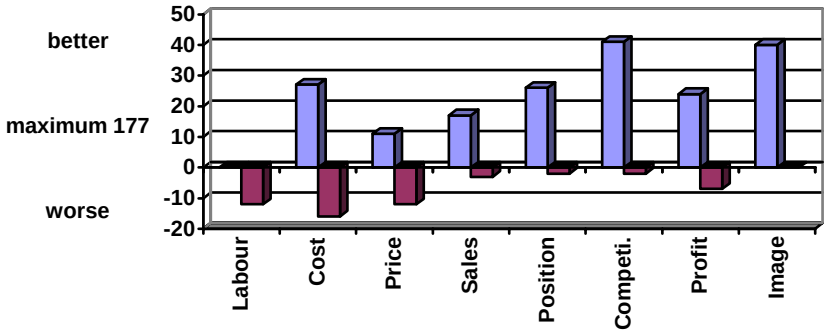


Fig. 5.4: “better” or “worse” weightings summed up for all initiatives (FTF)

In 40 cases managers feel, that environmental initiatives are good for the image. It seems, that such initiatives cannot be bad for the image. But they could be bad for profitability or competitiveness. Therefore, it is interesting that in 41 cases of initiatives the interviewees (general managers and environmental managers) see a link between single environ-

[6] The companies carried out 177 initiatives and for each initiative, eight weightings would have been possible.

mental initiatives and better competitiveness while only 2 see them as a hindrance. And while 24 see better profit linked to single initiatives only 7 see less profit.

5.2 Factors for competitiveness

The most important factors of competitiveness as seen by the interviewees are given in the following table.

Factor	Advantage			
	1.	2.	3.	Sum
quality	21	6	1	28
price	7	2	2	11
variety	2	10	1	13
Labour quality	1	3	2	6
service		7	10	17
environment		2	1	3
suppliers		1	2	3
marketing		1	1	2
consultancy services			4	4
Labour supply			2	2
capital availability			0	0

Tab. 5.7: Most important factors of competitiveness

These factors are reflected in the strategies of the FTF sample. 69% report a focus strategy, 33% have differentiation strategy and not a single company tries cost-leadership. For most companies quality, variety and service such become important factors. Nevertheless, price remains the second most important factor.

5.3 The Output-Hypothesises

In the PQ the only measure of business success was the export level. The first part of the analysis will focus on export and environmental performance.

5.3.1 Export

Per definition, best practice firms are economically successful. Economic success in the postal questionnaire is only measured by the export rate. A correspondence of the postal sample and official branch data exists with respect to the firms´ regions of activity. The branch association reported an export rate of 12.4 % in 1997, the sample firms are realising 8.7 % of their turnover in foreign markets. Looking closer, one can see that 31 companies have no exports at all, that 39 companies only sell up to 10 % of their products outside the German border, and that just 2 firms have an export level of more than 50 %, namely 64 % and 70 %. Considering this very weak export rate the German furniture industry can be characterised as a branch which is focused predominantly on its national

home market. And indeed, the sample contains a number of 61 firms which are acting primarily on the national level. But going into details is elucidating in this case, too. Doing so, it becomes apparent that not less than 25 companies are oriented mainly in their own regional area and that even 9 out of these 25 companies are doing business solely on a regional scale. Altogether, 32.4 % of the sales are distributed in the home region of the companies and 58.9 % in the national market.

Sales regional		**Sales national**		**Export**	
% of sales	No. of firms	% of sales	No. of firms	% of sales	No. of firms
0	21	0	9	0	31
1-10	23	1-10	7	1-10	39
11-20	9	11-20	4	11-20	9
21-30	8	21-30	4	21-30	8
31-50	5	31-50	6	31-50	2
51-70	5	51-70	21	51-70	2
71-90	8	71-90	26	71-90	0
91-100	12	91-100	14	91-100	0
Total	91	Total	91	Total	91
Regional sales in % of total sales	32,4	National sales in % of total sales	58.9	Export in % of total sales	8.7

Tab. 5.8: Regions of Activity (PQ)

On the basis of the data of the regions of activity it is now possible to rank the different firms of the sample according to the strength of their position in the export market. To determine the competitiveness ranking of the firms, it is necessary to split them into 5 groups, ranging from a low degree of national sales to high export rates.[7] This exercise unveils the fact that the firms of the sample can be divided roughly into three competitiveness groups of nearly the same volume: 31 companies rank low, 30 companies rank medium and 30 companies rank high (see Table 5.9).

Observing the relationship between competitiveness and firm size it becomes clear that even the smaller companies sell products outside Germany and that with a growing number of employees the portion of companies without any exports or with poor export rates is diminishing steadily. Except for one case, every firm with more than 50 employees is doing at least between 1 % and 9 % of its business in foreign markets. But size of course is not the only factor that matters with respect to a firm's competitiveness. So the two „export champions" of the sample with pertinent rates of 64 % and 70 % could not only be found in the "251-500"-category. Solely the first one is a company which employs between 251 and 500 people, whereas the latter is a firm with a staff of only 11 to 25 workers.

[7] Group 1: no exports, national sales = 0 % - 10 %; group 2: no exports, national sales = 11 % - 100 %; group 3: exports = 1 % - 9 %; group 4: exports = 10 % - 19 %; group 5: exports = 20 % - 100 %

			Employees of firms					
Competitiveness rank	% of firms	No. of firms	0-10	11-25	26-50	51-100	101-250	251-500
No exports, national sales = 0 % - 10 %	15.4	14	-	10	4	-	-	-
No exports, national sales = 11 % - 100%	18.7	17	2	4	10	1	-	-
Exports = 1 % - 9 %	32.9	30	2	4	9	7	7	1
Exports = 10 % - 19 %	17.6	16	1	3	5	5	1	1
Exports = 20 % - 100 %	15.4	14	-	3	2	2	3	4
Total	100.0	91	5	24	30	15	11	6

Tab. 5.9: Export and firm size

Following the hypothesis, it is expected that economically excellent performing firms will show better environmental performance than others[8]. But the data does not support this hypothesis.

Competitiveness rank	**Frequency in %**	**No. of firms**	**Compliance: 0-2 initiatives % of no. of firms**	**Compliance plus: 3-5 initiatives % of no. of firms**	**Excellence: 6-11 initiatives % of no. of firms**
No exports, national sales = 0 % - 10 %	15.4	14	21.4	57.2	21.4
No exports, national sales = 11 % - 100%	18.7	17	29.4	58.8	11.8
Exports = 1 % - 9 %	32.9	30	23.3	60.0	16.7
Exports = 10 % - 19 %	17.6	16	31.2	56.3	12.5
Exports = 20 % - 100 %	15.4	14	35.7	57.1	7.2

Tab. 5.10: Export Ranking and Environmental Performance Ranking (PQ)

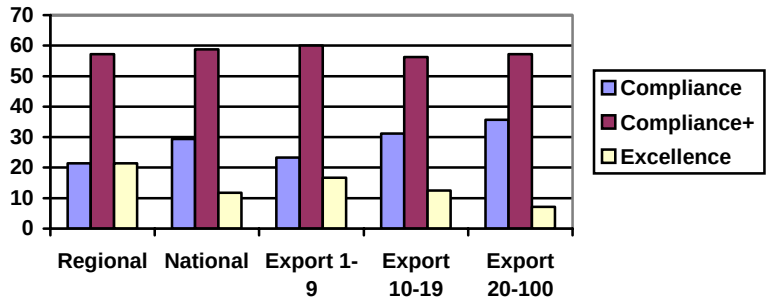


Fig. 5.5: Export Ranking and Environmental Performance Ranking (PQ)

[8] The definition of the compliance, compliance+ and excellent groups are given in chapter 2.1

No real dependence can be shown. The highest quota of compliance firms is in the group of the high exporters. The most excellent firms are contained in the regional group. Looking at data contained in the next table one is able to confirm this result in two ways:

a) there is no dependence between firm size and environmental performance: in every size category the majority of firms belong to the compliance plus category and the biggest amount of excellence firms can be found in the 11-25 group and not in the 251-500 group;

b) although the highest export quota is related to excellence firms in the 251-500 category, in all other size categories compliance firms (3 times) or compliance plus firms (2 times) realise higher export rates than the excellence firms.

	Rank	**1-10**	**11-25**	**26-50**	**51-100**	**101-250**	**251-500**
No. of firms	Compliance	1	7	9	4	3	1
	Compliance +	3	11	20	9	6	4
	Excellence	1	6	1	2	2	1
Level of exports	Compliance	3.0 %	16.6 %	8.1 %	13.5 %	9.0 %	26.0 %
	Compliance +	3.3 %	3.6 %	4.8 %	8.3 %	21.8 %	25.5 %
	Excellence	2.0 %	0.2 %	5.0 %	5.0 %	9.0 %	30.0 %

Tab. 5.11: Competitiveness, Environmental Performance and Firm Size (PQ)

If anything can be said at all, the hypothesis is wrong. But it may also be, that the idea of shrinking down economic performance measurement to one measure (export) is wrong. Specially in a country with a low export level like Germany economic performance has to be proven on the home market. Profitability, productivity, growth and wage level are measures of competitiveness which are also important for the home market. These measurements are possible on the basis of the face to face interviews.

In contrary to the PQ-sample, the hypothesis can be proved by the FTF results.

Export rank	**compliance**	**compli-ance+**	**excellence**	**Total**
No exports, national sales = 0 % - 100 %	7	6	2	15
Exports = 1 % - 9 %	1	1	1	3
Exports = 10 % - 19 %	0	1	4	5
Exports = 20 % - 100 %	1	4	4	9

Tab. 5.12: Export in the performance groups (FTF)

Average export levels are 2,3% (compliance), 11,2% (compliance+) and 17,9% (excellence).

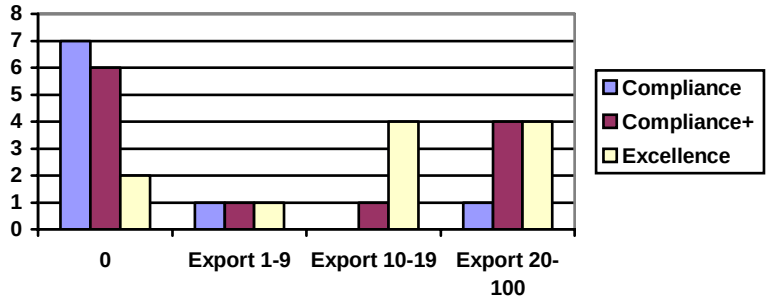


Fig. 5.6: Number of exporting firms (FTF)

It is obvious, that the FTF-sample supports the hypothesis.

5.3.2 Other measures of business success

The business success in the FTF was measured by some additional indicators. The following table shows these indicators cross tabulated with the environmental performance groups.

	Compl	Compl+	Excell	All Firms
Av. Turnover (T. Euro)	6.650	14.360	26.680	16.400
Av. Productivity per capita (Euro)	100.400	88.400	103.730	97.000
Av. Productivity (€ per head) only calculated for firms with given raw material cost (identical with value added group)	100.400	85.500	93.200	
Av. Value Added per capita (Euro)	64.900	50.400	58.200	57.600
Av. Level of exports %	2,33	10,82	25,70	20,9
Av. Employment 1999	49,1	97,2	230	129,2
Av. Employment Growth 1994-1999 in % (based on sum values for the group)	-12,5	+3,6	-15,2	-10,3
Av. Employment Growth 1994-1999 in % (based on individual percentages)	-4,65	64,5	5,13	24,66
Percentage of firms in the group expecting growth in the forthcoming three years	33%	75%	45%	53%
Av. Development Staff %	1,3%	1,1%	4,91%	3,46%
Av. Qualified Staff / Staff %	63,85	68,49	74,59	69,1
Av. Worker Wage (Euro per hour)[9]	11,25	11,50	12,15	11,45
Av. Age of machinery (years)	5,17	6,00	4,38	5,25
Sample Size	9	12	11	32
Av No of Initiatives	4,11	4,67	7,18	5,38

Tab. 5.13: Environmental Performance (Ranking Score) and Economic Performance Indicators

[9] Wages data only from part of the firms.

Additionally, we asked for expectations in the forthcoming years. Half of the firms expect growth, 30% stability and 18% shrinking. Only about half of the firms expected a profit in 1999, one third expect a break-even and 15% a loss.

Fig. 5.7: Percentages of the groups and their expected profit levels

The profitability of the excellent firms seems to be slightly higher than the compliance+ firms. Wages are higher in the compliance+ and excellence firms. Measured against the indicators wages, profitability and exports (only FTF), the research shows that environmental initiatives have a positive economic effect. Change of employment is best in the compliance+ group, it is shrinking less than the other two.

It could be argued that the effects shown are only a result of the bigger size of compliance+ and excellent firms compared to compliance firms. A matched pairs analysis of 8 pairs of compliance and compliance+ firms of similar size and product range resulted in the following table:

	Compl	**Compl+**
Av. Turnover (T. Euro)	7.200	6.900
Av. Turnover per capita (Euro)	138.000	121.000
Av. Value Added per capita (Euro)	69.400	47.800
Av. Level of exports %	2,6	10,8
Av. Employment 1999	52	57
Av. Employment Growth 1994-1999 per year in %	-2.8	+3.7
Percentage of firms in the group expecting growth in the forthcoming three years	37	75
Percentage of firms in the group expecting profit in the next year	37	75
Av. Development Staff %	1.4	1.3
Av. Qualified Staff / Staff %	54	79
Av. Age of machinery (years)	5.17	6.86
Sample Size	8	8

Tab. 5.14: Environmental Performance (Ranking Score) and Economic Performance Indicators of eight matched pairs

The profitability of the compliance+ firms within matched pairs seems to be higher than the compliance firms. Measured against the indicators growth, profitability and exports, the analysis of matched pairs also shows that environmental initiatives have a positive economic effect. But a considerably lower value added and older machinery create doubts about the positive effects. In principle, these results do not vary from the results which were obtained by comparing the complete performance groups.

5.4 The Input Hypothesises

5.4.1 Management Culture

In the postal questionnaire, management culture is measured directly by just one question on values and by three questions on strategies and influential factors. For understanding the direction of activities (and the general approach to environmental initiatives) in a company it is important to know, which strategy the company has adopted. After long years of environmental regulation following the “command-and-control” idea, the strategy “complying with regulations” seems still to be the dominant strategy mentioned by 47 of the PQ companies. Important are also “cost strategies”, which are mentioned by 41 of the PQ-companies. But market related strategies are important as well. The improved brand image by eco-products (27) or eco-practices (25) and the development of new markets (10) show, that a lot of firms already have adopted environmental strategies linked to market success. In the smaller FTF-sample results are more or less similar.

Therefore the mentioned strategies show, that companies may be in a transformation process, in which reactive compliance strategies are replaced by cost and market strategies in many companies.

Main focus	Number of answers (PQ)	% of answers (PQ)	Number of answers (FTF)	% of answers (FTF)
Complying with regulations	47	31,3	9	36,0
Reducing costs	41	27,3	8	32,0
Improving brand image by eco products	27	18.0	5	20,0
Improving brand image by eco practices	25	16,7	2	8,0
Developing new markets	10	6,7	1	4,0

(More than one answer was possible in PQ: N = 150, in FTF N = 25)

Tab. 5.15: Environmental Strategy

The distribution of the answers to the question for the most influential factor on final decisions about environmental issues supports the picture of very different strategies. About one third of the companies see the most influential factor in regulations, one third in management awareness and one third in customer demands.

Factor	Number of firms	% of firms
Regulations	33	39.3
Management awareness	26	31.0
Customer demands	25	29.7
Total	84	100.0

Tab. 5.16: Most Influential Factor (PQ)

All three factors seem to be nearly equally important. Regulations are mentioned slightly more often and represent a core of re-active firms. Management awareness stands for a core of pro-active companies. It will reflect different external influences settled down in the mind of management and therefore represent an indicator for environmental management culture.

The factor “customer demands” may also be interpreted as re-active. But on the other hand, we consider market orientation as being relatively pro-active.

One can be puzzled by the fact, that independent from facts supporting the thesis that environmental initiatives cause positive market and cost effects still most PQ-companies believe, that the main effects of environmental legislation are improvements to the good of society in general and they are an obstacle to their market competitiveness. Not more than 1 PQ-company agrees with the statement that environmental legislation encourages an increased efficiency of production.

The answers to this question show clearly, that companies with more openness concerning environmental affairs were more likely to allow interviews. 31% of the FTF-companies see the main impact of environmental legislation to be encouragement of increased efficiency in production.

Effect	Number of firms (PQ)	% of firms (PQ)	Number of firms (FTF)	% of firms (FTF)
Improvement to the good of society	44	50.6	12	41,4
Obstacle to competitiveness	42	48.3	8	27,6
Encouragement of increased efficiency in production	1	1.1	9	31,0
Total	87	100.0	29	100.0

Tab. 5.17: Main Effect of Environmental Legislation

Finally, looking at the degree of agreement with the opinion „people worry too much about whether economic development damages the environment“, one got the impression that for most of the PQ-sample companies, environmental topics actually have an importance which is not adequate to their real relevance. Two thirds of the PQ-firms do at least partially agree with this statement, whereas one third do at least partially disagree with it. Going a bit more into detail, on the one hand it is possible to recognise the positive fact that only 3 companies are showing full agreement and that the majority of the agreeing firms still is able to admit some legitimacy to this opinion. On the other hand though, only 7 companies are expressing full disagreement, whereas 22 companies out of the group of disagreeing firms think that the statement is not totally wrong.

The high percentage of full disagreement shows again, that the FTF-sample was somewhat different from the PQ-sample.

Degree of agreement	Number of firms (PQ)	% of firms (PQ)	Number of firms (FTF)	% of firms (FTF)
Full agreement	3	3.3	2	6,7
Partial agreement	59	64.8	8	26,7
Partial disagreement	22	24.2	5	16,7
Full disagreement	7	7.7	15	50
Total	91	100.0	30	100.0

Tab. 5.18: Degree of Agreement with the Statement „People Worry too Much about whether Economic Development Damages the Environment“

A look at the findings of this section, which is in a way more differentiated, can be taken by cross-tabulating the competitiveness ranking with some of the environmental strategy and attitude issues. In this case one will see that to comply with regulations is a strategy preferred especially by those companies which have a weak market performance. On the contrary, instead of merely following regulations, firms with high export rates are focused on the development of products (with ecological attributes). Consequently, these companies are hardly influenced in their decision-making by regulations, whereas companies with a low competitiveness-ranking frequently are not strong enough to go a step beyond regulation. In the light of this background, it is no wonder that for these firms environmental legislation is a hindrance to competitiveness, but not for the companies which are successful in foreign markets.

	No exports, regional sales >90 %	No exports, regional sales <90%	Exports 20 % - 100 %
Environmental strategy: complying with regulations	71,4 %	58,8 %	21,4 %
Environmental strategy: improving brand image by eco-products	14,3 %	35,3 %	42,9 %
Influence on final decisions: regulations	50,0 %	47,1 %	28,6 %
Effect of environmental legislation: hindrance to competitiveness	42,9 %	64,7 %	21,4 %

Tab. 5.19: Environmental Strategies and Attitudes and Export Ranking (PQ)

5.4.2 Machinery, qualification and R&D

It was assumed, that newer machinery would contribute to environmental performance.

%	Compliance	compliance +	excellence	All
less than 2 years old	11	18	15	16
less than 5 years old	34	37	23	31
less than 10 years old	22	21	43	29
More than 10 years old	33	24	21	25

Tab. 5.20: What proportion of your machinery (number of machines) is how old? (FTF):

But in fact, for furniture manufacturing this might not be true. If we look closer in the nature of the environmental impacts and on the sorts of machines, the picture becomes clear. The high number of machinery in a furniture workshop are saws, drilling machines and other woodworking or mechanical devices. But environmental impacts might only be influenced by energy and coating plants. In the proportion of new machinery, no clear influence can be seen.

Table 5.21 shows average investments which were made in connection with the environmental initiatives. Only energy and solvent reduction investments are high. Other environmental initiatives might be supported with comparatively low investment budgets.

Size	EMS	Eco-Design	Energy	Mat. Change	Waste	PKG	Solvent Red	Env Comms
1-10	0	0	17.000	0	380	0	500	0
11-25	0	0	16.300	0	850	250	5.000	0
26-50	0	0	143.000	0	0	0	22.000	0
51-100	15.300	40.100	422.000	0	14.700	0	10.200	0
101-250	52.800	2.600	1.370.000	0	1.700	0	53.700	4.000
251-500	46.500	12.800	1.930.000	0	14.500	1000	655.000	2.500
Total average investment, weighted	42.100	17.200	634.000	0	6.400	625	254.000	3.000

Tab. 5.21: Investment by initiative (Data only from part of the firms, FTF)

The influence of qualification was also not very visible.

Employees	Degree	Technical National Certificate	Meister	Appren-ticeship	On the Job	Em-ployees
compliance	1,2	0,8	1,7	23	23	49
compliance +	3,2	5,1	6,3	153	40	208
excellence	6,7	10,5	14,7	155	55	242
Percentages						
compliance	1,9	2,9	4,7	54	37	
compliance +	2,2	3,0	10,3	60	25	
excellence	2,0	2,7	9,1	64	23	

Tab. 5.22: Qualifications in the FTF-sample

Bigger companies have more qualified people, but the percentage of employees with degrees or technical certificates does not differ very much. But in the workshops of compliance+ and excellence firms there are twice as much Meisters and some more employees who have undergone an apprenticeship.

Regarding the R&D capacities and their relationship with the factor „size", a lot of small firms have a full-time R&D staff of 1 or 2 people, but in particular companies with more than 100 employees have R&D departments with 3 or more people. In 50 companies, R&D also leads to results concerning environmental aspects.

No. of people	0	1-2	3-5	6-10	11-20	21 plus	Total
Full time	18	36	25	11	2	1	93
Part time	40	30	22	1	0	-	93

Tab. 5.23: R&D Capacities (PQ)

89 % of the companies with pertinent capacities are convinced that R&D is important also with respect to their environmental performance of products or processes.

Employees	0	less than one job	up to two	up to four	up to ten	more than ten
compliance (9)	5	1	2		1	
compliance + (12)	3	5	3	1		
excellence (11)	0	2	1	3	2	3

Tab. 5.24: Number of firms with R&D people (FTF)

The average number of R&D positions is 0,79 (compliance), 0,87 (compliance+) and 10,08 (excellence). It has to be taken into account, that in some firms product related R&D is carried out externally by design teams.

Of the 128 R&D positions in 32 firms 111 are situated in the 11 excellent firms. They do practically all the R&D of the sample. In the other firms, R&D has probably only the capacity to maintain production technology and copy "me too" products.

Furniture is widely copied if market success occurs. The position of the excellent firms as the R&D department of the whole sector may therefore be important also for policy. Product innovation could be fostered by helping the excellent firms in development and waiting for other firms to copy – as they usually do.

5.4.3 Information and advisors

The most important data regarding information is contained in the answers to the question about problems arising. It is crystal clear that companies do not have in mind informational problems or problems in the availability or cost of help.

	the 3 most important problems				
	1.	2.	3.	Sum.	Sum. %
It is hard to find the capital for investment	17	2		19	57,6
The regulations are too uncertain to plan for new technology	2	7	7	16	48,5
Clean technology is still risky and unproven	4	5	2	11	33,3
Clean technology investments do not show an adequate return (payback period is too long)	1	5	2	8	24,2
We do not have the right skills and expertise in-house (e.g. R&D)		2	5	7	21,2
Lacking R&D capacity	3	1	1	5	15,2
Management does not have enough time	2	2	1	3	15,2
Middle management lacks environmental commitment		2	3	5	15,2
Risk of success			5	5	15,2
Top-Management lacks environmental commitment	1		2	3	9,1
Availability of good technology		2	1	3	9,1
It is hard to get good advice		1	1	2	6,1
Suppliers do not provide any help in adopting environmental initiatives	1			1	3
Environmental consultancy services cost too much		1		1	3

Tab. 5.25: Most important problems associated with environmental initiatives (FTF)

But there are very important informational problems. They exist in the availability or possibility of knowledge. Since policy is dependent on regular elections every four years, regulations are often too uncertain to plan for new technology. The periods of use and the payback periods are much longer than the time, for which policies are predictable. And even if policy is clear, clean technology is still risky and often unproven. The “entrepreneurial risk” to decide in the absence of full information may instead of this missing information enable companies to move. But it is anyway necessary to repeat the demand to politics to spell out a clear regulatory framework. Long time planning would be easier with long time policies. The Dutch “national environmental plan” with its “voluntary agreements” with single sectors may be a possible instrument to provide this clarity.

But the uncertainty about new technologies can never be taken off companies. The management can wait for clarity, but than, the competition may already be moving ahead.

The list does also show, that there may be a problem with reception of information. Lacking R&D capacity and the lacking time of management to deal with environmental problems give us the idea, that it may be much harder for companies to take up and process information than to find it. The price of information (by consultancies) seems to be no important problem. Companies think, that this kind of advice should be provided:

For free	14
With payment for the professional services	3
As a return of the association fee paid to professional association	10

Tab. 5.26: Advice should be provided? (FTF)

German companies are obviously used to free or membership information. Public agencies, trade unions, safety&health associations, suppliers: they all will provide advice at very favourable conditions or completely free. A lot of magazines offer information for the furniture sector at a reasonable prize. Cost as a limiting factor was mentioned only in the context of suppliers offering ecological, more expensive products or concerning professional consultancies.

Two limiting factors were instead mentioned by many of the advisors: time and knowledge about the importance of the problem.

Imperfect information is obviously possibly to blame not onto the advisors, but onto the managers of the firms. Their ability to take up information is described by some advisors to be very limited. Some of the “free” advisors told us, that they expect need for advice to be much higher that actual request. They saw the limiting factor in the ability of the managers to take up advice and deal with its consequences. That time is a scarce resource can also be found as a reason behind some “problems” and could be experienced by the research team asking for interviews. And imperfect information is a problem in itself, in the fact, that there simply does not exist information at all. This is the case in information about new (unproven) technology and about policies of future years. The entrepreneur has to deal with this kind of imperfect information. Crying doesn’t help.

5.5 The hypothesises as part of a system

It may be of use to see the hypothesises as part of an interrelated system of variables. Within the system given in the figure it is shown by the research, that legislation and market are really an important influence on the environmental initiatives of the furniture sector. Direct influence of the public opinion could not be found, since no relevant opposition or help by stakeholders was experienced by any firm in the face to face interviews.

The role of the advisors seems like a helping role rather than a driving role. Limits to the activities of the advisors are set by the ability of the firms to take up and process advice.

Within the firm, it can be shown that strategy and values of the management interrelate with environmental initiatives.

Employees qualifications on the shop floor level and in the R&D department seem to be a necessary input for excellent environmental performance.

It is clearly shown that environmental initiatives do not exist independently. Only integrated initiatives could be found, which are driven by at least two of the four drivers legislation, market, cost and safety&health. It is therefore not very helpful to speak of environmental initiatives. It would be much closer to the companies to speak of product and process innovations and their results concerning employment, economic and environmental performance.

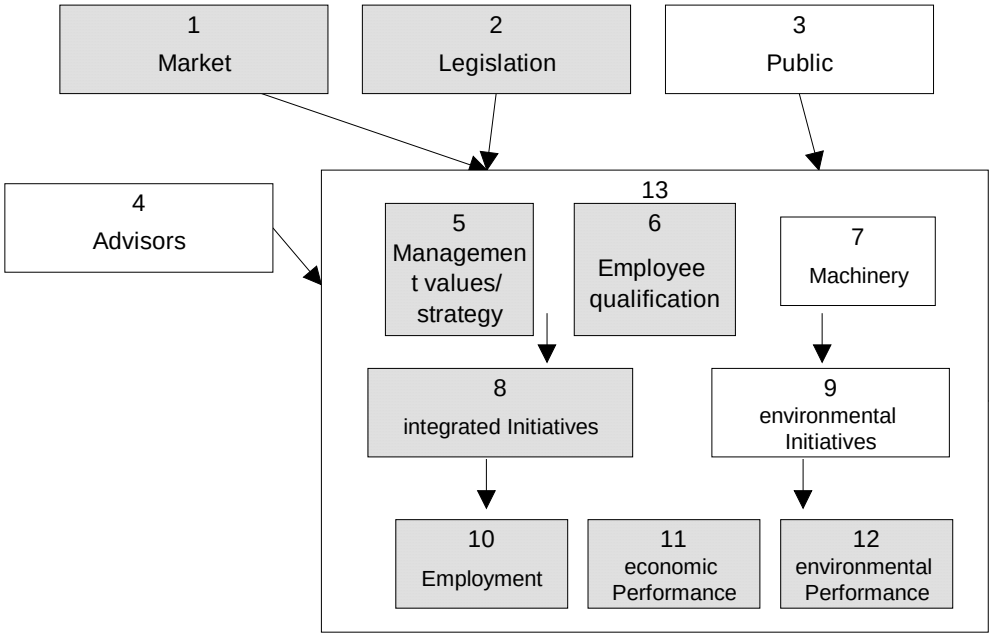


Fig. 5.8: A model of the company (important variables dark)

It can be shown that initiatives with an expected environmental outcome have in most cases also a positive impact on employment (positive here – in opposition to the stock exchange discussion - meaning more employment). It seems to be comparatively easy to protect the environment by doing more work.

Most economic indicators rise with environmental performance. It could therefore be shown, that integrated environmental initiatives in the furniture sector make it possible to create more jobs and, by higher product prices and a stronger position in the market, get the work paid for by the market.

The variables 3 (public), 4 (advisers) and 7 (machinery) seem to be less important for the continuous environmental improvement. Variable 9 (environmental initiatives) is not important compared to variable 8 (integrated initiatives).

In principle, the variables are interconnected as shown in the figure and lead to the triple dividend of profit, environmental performance and labour.

5.6 Environmental initiatives

There is a lot of information in the answered questionnaires concerning details of initiatives.

5.6.1 Environmental Management Systems

14 companies have certified management systems, 7 according to EMAS or ISO 14 001, 10 according to ISO 9 001. The driver was seen mainly in the market (66%). The companies real behaviour does not completely change by the implementation of a management system. Many aspects, which were taken into account ever since, will simply be afterwards part of the system. In Germany, the modern aspects recycability, take back and

repair of products and natural/ ecological raw materials will be emphasised in the implementation of an environmental management system.

A lot of work has also often been spent to meet new EU-regulation on hazardous materials (of about 1993).

	before	**After**
Waste	15	16
Energy	15	16
solvents	9	11
recycability	**8**	**12**
Transport	9	9
Noise	15	14
Storage of hazardous materials	**10**	**16**
Packaging	12	11
takeback and repair of products	**8**	**11**
Eco-design	**8**	**11**
natural/ ecological raw materials	**9**	**13**
use of recycled raw materials	9	10
durable products	16	16

Tab. 5.27: Initiatives before and after implementation of an EMS (FTF)

The implementation of an EMAS has obviously the function of filling gaps

It may also be interesting to look inside the management system in individual instruments.

One part of environmental management seems to grow independently from formal management systems: the environmental performance of suppliers will be evaluated by many firms independent of an EMS. At least at a quality management level environmental requirements find hereby their way into daily practices of management.

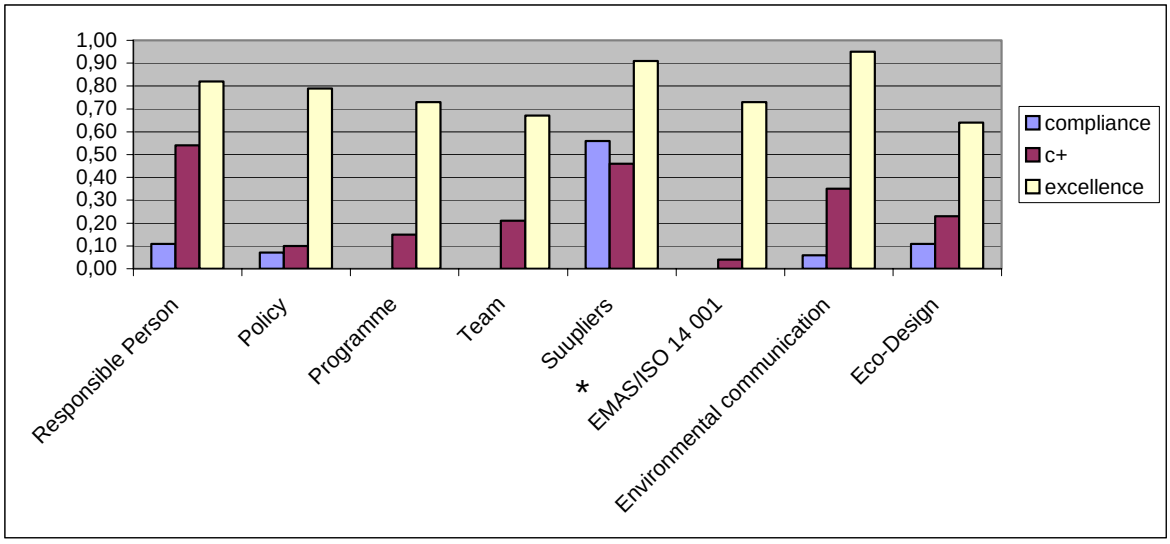


Fig. 5.9: Elements of an EMS in the performance groups

The nature of the initiatives might sometimes be learned from the experiences of the firms. We have therefore documented a set of "stories", which were told during the face-to-face interviews.

Initiative: Environmental Management System/Eco Design

The company´s EMS, which has been certified since 1997, was installed with the aim of systematically improving the already existing environmental protection activities. An article by Professor Meinholz of the Fachhochschule Furtwangen concerning EMAS attracted the attention of K. in the first place. The board of directors invited Professor Meinholz to give a speech about this issue which obviously was so convincing that an eco-team was established to prepare (partially together with workers) the introduction of EMAS. Members of this team, which is still in existence, are the director in charge of production, the R&D manager, the factory manager and the environmental manager. External advice with respect to the organisational methods of EMAS was given by the Umweltzentrum Villingen-Schwenningen. Without this help it would not have been possible to install EMAS. Overall, EMAS required an investment of 55,000 Euro. After the payback period of 2 years, it is believed that EMAS will save the company money.

In connection with this investment, the company paid another 2,500 Euro to implement an eco design process. K.´s eco design principles encompass the following topics: useful life extension, no adhesives, return guarantee for products and full recycleability of products. Up to now only one range of chairs, called „Ceram Basic", fulfils all these design guidelines. It has been on the market since 1996 and is considered to have a positive impact on the firm's competitiveness and public image.

Initiative: Environmental Management System/Eco Design

G has official environmental policies and improvement programmes as well as an environmental team, all since 1997, when they presented their first environmental report. They systematically collect data for controlling environmental improvement and they evaluate the environmental performance of suppliers whenever alternatives exist. Total management time dedicated to environmental issues is estimated to be 50 workdays per year. They communicate their environmental efforts as an additional benefit and not as a major characteristic via their environmental report, leaflets and to some extent via more general

brochures. In addition G has a small range of ecological products, which doesn't sell well, but offers a lot of know-how, that to some extend diffuses into the other products.

5.6.2 Environmental communication

Environmental communication is done by all of the excellent firms and 54% of the compliance+ firms.

Environmental product information	16
Guided visitor tours	12
Environmental report/statement	7
Talks at meetings and conferences	3
Press conferences	2
Sponsorship	2
Hotline	1

Tab. 5.28: Instruments of environmental communication (FTF)

In 11 companies an eco-marketing strategy for certain products requires environmental communication. The main driver is the market.

Opposition or help of stakeholders in marketing eco-products is scarce in this industry. Just one company remembered opposition by an environmental group, in one case each support came from local politicians, media and employees. The conclusion is, that the "public opinion" is of no big influence on furniture firms.

Initiative: Environmental communication

NM employ most instruments of environmental communication, but mostly with a broader focus, because eco-products cover only a small part of their activities, so that hotlines and press-conferences are mentioned, although few of these activities are related to environmental issues. However, Mr B claims that the efforts are more pronounced in internal marketing activities.

5.6.3 Solvent reduction

Only nine cases of solvent reduction technologies were reported by 18 companies active in solvent reduction. These technologies are quite expensive and are mainly not profitable.

As drivers the market (39%) and health&safety (28%) are given in the FTF.

Plant or machinery	Investment Cost	Cases	Profitability
Solvent free pre-treatment of metals	5000 – 10000 €	2	neutral to small
Water based coating or powder coating	500.000 – 800.000 €	3	costly to neutral
UV-coating	75.000 €	1	very good
Solvent recovery plant and Vapour incineration	1,25 mil. €	1	costly
Hot melt adhesives	?	1	?
Coating cabins	50.000 €	1	good

Tab. 5.29: Solvent reduction technologies (FTF)

Initiatives are often linked with health&safety aspects. Companies report, that the initiatives drive cost up (4) and not down (1), foster sales (2), position in the market (3) and competitiveness (7) as well as image (5).

Initiative: Restructured surface-treatment

In 1995, when Mr G. became production manager, the precautions for the worker's health were out of date. Leadership and communication style were dysfunctional. So, in cooperation with the workers council and the local Health and Safety Executive changes to working style and procedures were introduced. Measures included the implementation of exhaustive devices and escape routes. While no substantial investments in capital assets and human capital were made, quality and work satisfaction increased substantially. The level of work-related sicknesses has decreased.

Initiative: Hotmelt Adhesive/Dispersion Adhesive

In 1993 the board of directors was looking for an alternative to the adhesive containing solvent traditionally used. They would have voted for the nearly solvent free dispersion adhesive if the quality had not been so bad at that time. So K. decided to change to hotmelt adhesive, which contains between 30 % and 35 % solvent. But having used this kind of adhesive for 2 years the firm suddenly found itself confronted with customer complaints about lack of product quality: because the hotmelt adhesive was not good enough, the covers of some chairs had become folded. So only two years after changing to the hotmelt adhesive, which was an investment of 20,000 €, the company again had to change to a new adhesive technology. And in the light of remarkable improvements in quality, K. now decided to invest 10,000 € to be able to process dispersion adhesive. Except for the know how of the adhesive suppliers and the adhesive plant suppliers for both initiatives no external advice was necessary. The workers did not participate in the decision processes but they had to be trained in the use of the new adhesive technologies.

Initiative: U.V. Varnish Plant

In the late 90s the company was looking for an alternative to its varnish plant which had been running with varnish containing solvent. There were two possibilities: to invest in a water-based or U.V. varnish plant. Although using the second option could only reduce the solvent emissions by about 23 % the top management voted for this technology because of the opportunity to integrate it in the existing varnish plant. The plant was pur-

chased by a German company and the workers had to be trained in the use of it. There were no problems. The plant was an investment of 36,000 € which is not believed to save money.

Initiative: Water based varnish plant

Mr. CA and the eco-management team identified the problem and the solution. A team together with production-management and production-planning got the new plant running. Advice was given from several varnish suppliers. The natural raw material based eco-coat supplier failed to meet quality targets. The plant was purchased in Italy. Workers and Meisters had to be trained on it. There were many quality problems and a lot of additional waste in the first month of operation. The plant was an investment of 0.8 million € and is meant to save money now, though nobody knows exactly how much.

5.6.4 Waste management

All of the FTF-firms separate waste. Data could be given by all of the excellent firms, 92% of the compliance+ firms and 67% of the compliance firms.

Paper and cardboard	32
Household type waste	30
Wood	29
Steel waste	27
PE-film	26
Special waste form painting or electroplat-ing	25
other metal waste	17
Plastic foam	16
Plastic waste for reuse at the supplier	14
Other	11

Tab. 5.30: Types of waste disposed of separately (FTF)

Main reasons for waste management are regulation and cost. It is striking, that companies experience very different economic results of waste management. While 7 companies report reduced cost, 7 others report higher cost. While three report better profit, 4 report lower profit.

Initiative: Waste separation

Some waste separation (wood, steel) was made ever since, but in 1992 a report was demanded by regional authorities in Northrhine-Westfalia. This led to the identification of opportunities. A „waste manager“ was qualified and he and the eco-manager did most implementation themselves. Some waste boxes had to be purchased (small investment), employees were trained and some help came from the local chamber of commerce (work-

ing circle on environment). In the first time, it was hard to get the employees to properly follow instructions but its fine now. Waste separation is considered a profitable task.

Initiative: Separation of Varnish Tins

In 1990 the director got a letter from the companies varnish supplier ICI in which he was told that from now on empty varnish tins had to be collected separately from the remaining waste streams since ICI had been obliged by regulation authorities to take these back. To fulfil this task ICI hired the disposal company R.. Besides collecting the tins the only thing to do for M.T. is to call this company when there are enough bags (6 - 8) to pick up. No problems occurred, no external advice, no training of employees and no investment was necessary. But because of the obligation to take the tins back ICI raised its varnish price by 5 % so that separation of varnish tins is thought to have negative influences on competitiveness.

Initiative: Waste Separation

In 1990 PRSR was forced by a regional official body to separate its waste streams on and after a specific date this year. Having discussed how to meet this requirement, the management voted for the solution to outsource this task completely to a specialised company. As a result the production manager was given the responsibility to choose an appropriate firm (finally the company K.) and with the help of this firm to instruct the workers. From the outset waste separation could proceed without any problem. It was not possible to get information about the costs of this outsourcing model but the company does not considered waste separation to be a profitable task.

Initiative: Waste Separation

In 1991 city authorities obliged the company to separate its waste. The director and the production manager (Meister) together implemented a method (no investment necessary) which in the first few weeks failed to separate the waste streams in the right way. Having got advice by an expert of the cities waste agency, the company could avoid the initial mistakes in the future. Since then waste separation has been working without any problems.

Initiative: Waste separation

Waste separation was described as rather instinctive behaviour. The idea of a big container where everything was being dumped in apparently violated Mr M. sense of order. In addition, this measure saves a lot of disposal costs.

Initiative: Waste Register

Since 1998 the company has been running a waste register. The decision to invest 2.500 € in such an initiative was made by the board of directors with the aim to create an integrated instrument which will be able to collect all the pertinent data of the firm. External advice was given by the Umweltzentrum Villingen-Schwenningen and the Waste Consulting Agency ABAG in Stuttgart which delivered a special software tool free of charge. This tool had to be adapted to the companies needs which was no problem for its computer department. The workers and the meisters participated in the implementation process of

the register. The meisters are responsible for periodically sending the waste data of their section to the environmental manager who is keeping the register. The main advantage of the register is seen in the possibility now available, to systematically consider the amounts and types of the companies waste streams, and in doing so to identify for example the recycling potentials not previously perceived.

5.6.5 Energy

Initiatives in energy efficiency are clearly driven by cost (71%). 27 out of 32 companies are active. Companies report, that the initiatives reduce cost (9) with influence on prices (4), foster sales (3), position in the market (3) and competitiveness (5). A positive influence on profit is reported by 7 companies. This is the highest number of companies mentioning a positive influence on profit of all initiatives.

		Investment		relative savings
Initiative		Cost	Date	
1 Energetic use of chips	18	8.000 € up to 1 mil. €	since 1969	3 times low savings, 11 times high savings
2 Combined heat and power plant	2	600.000 € and 3.5 mil. €	90´s	one case high savings, one still in progress
3 New, energy efficient coating plant	2	600.000 € and 800.000 €	90´s	one case low savings, one case high savings
4 Energy efficient heating systems	5	7.500 € to 40.000 €, 1 case 3 mil. €	90´s	two cases low savings, one case medium savings, one case high savings
5 Energy efficient lighting	3	1.500 € to 15.000 €	90´s	one case low savings, two cases unknown

Tab. 5.31: Energy efficiency initiatives (FTF)

Initiative: Wood burning furnace

In 1995, a year after founding, a wood burning heating system was installed. It was an investment of 15.000 € and lowers the cost of energy to 250 € per month, which is considered to be very low for this type of a 500 m² carpenters workshop. An investment was due anyway, for the old system in the rented building was no more usable. The idea was obvious, since wood burning is commonly known as technology for carpenters.

Initiative: Energetic Use of Chips

In the early 90s the company faced a rise in turnover which also led to a higher amount of chips. It had to be investigated whether these chips should further be treated as waste or if there was a possibility to use them to produce energy instead. Because of cost arguments the director, together with the production manager (Meister), preferred the latter and so they engaged the engineering consultants Ingenieurbüro W. to select and implement an appropriate technology. The co-operation with the consultant was very satisfying since no problems occurred between the two partners or with regard to the installation and running of the plant. Total cost of the investment was 123,000 €, including 24,000 € for the advisor. It is a success in both economic (- 2 % operating cost) and ecological terms.

Initiative: Energy Saving Insulated Doors

In reaction to complaints by the employees who found it too cold in the factory rooms during the colder season, the director decided to purchase energy saving insulated doors in 1998. He gave this project to the metal-working company B. which belongs to his son-in-law. No problems occurred regarding this investment of 5,000 € which saves the company an unknown amount of money and energy.

Initiative: Combined heat and power plant

Because of an idea of a son of the owner, a major investment was made recently. After long planning by a university professor, specialised firms delivered a huge power plant worth 3.5 mil. €. It is expected to save several 100.000 € a year, but since the plant is very new, no data for verification is available. The technical staff had to be trained to run the new plant. This was done by TÜV. Pay back is expected after about 7 to 8 years. Problems were the state of technology and the fact, that a special design had to be made. Time management was critical as well.

Initiative: Paper burner

In 1996 the old coal boiler was replaced by a boiler running on paper and cardboard. After using 70 t of coal the company now burns 10 t of paper and cardboard per year. Mr K said that he himself realised the need for action and decided what to do. No workers or other employees participated. After talking to a couple of suppliers he reached a decision and MAX delivered an aggregate for 200.000 € which reportedly saves 15.000 € per year.

5.6.6 Packaging

The classic method of packing furniture is still “returnable blankets”. Most companies still use this cheap and ecological method. Most others pack in one way cardboard. Returnable packaging, lightweight cardboard as well as composite materials do not play an important role.

Not at all, we use returnable blankets	20
Cardboard one way	12
Cardboard used several times	2
Lightweight optimised cardboard	2
Special returnable packaging type	3
Single material	13
Composite materials	3

Tab. 5.32: Methods of packaging used by firms (FTF)

As reason for ecological initiatives in packaging, cost (11) and market (6) were mentioned. Only about 9 years after the “Töpfer Take Back Law” on packaging it is striking, that only one company mentioned regulation to be a driver.

5.6.7 Avoiding toxic substances and choice of natural/ eciologic materials

Wood is in the centre of ecological initiatives concerning materials choice. Nearly all companies know, that formaldehyde is problematic and has to be controlled. Nearly all of the companies use some solid wood as a more ecological material.

But also plastics (PVC, heavy metals)and leather (heavy metals) as well as pesticides in wool are objects of ecological improvements.

Formaldehyde e.g. in chipwood	26
Compounds containing chlorine e.g. in PVC	18
Heavy metals e.g. in leather, plastics	17
Pesticides e.g. in wool	14
Other	2

Tab. 5.33: Avoidance of toxic substances (FTF)

Material	up to 10%	up to 20%	more than 20%	Sum.
Solid wood	11	2	14	27
Wood from sustainable managed forests?	4	1	16	21
Textiles with eco-labels	3	1	5	9
Leather tanned without chromium	2	1	5	8
Other	1	1	3	5

Tab. 5.34: Natural and ecological materials (FTF)

As reasons for ecological materials the market (22) and health& saftey (4) were mentioned. It is striking, that the majority of excellence firms using solid wood purchase from sustainable managed forests while in the compliance group, not many companies pay attention to the origin of the material.

Initiative: Leather Tanned without Chromium/E 1 Chipboard

In 1994 the management decided to become a member of the German Association of Quality Furniture (DGM). In the first place the decision was aimed at improving the marketing power of PRSR but it also has had ecological consequences. Even before 1994 the company had been manufacturing to a considerable degree leather tanned without chromium and E 1 chipboard but after becoming a member of the DGM, PRSR was forced to process nothing but this kind of leather and chipboard. This step could be undertaken without any problems but it caused additional costs of 30% to 50% of that group of material so that the use of ecological materials was mentioned to be a disadvantage in terms of profitability.

Initiative: PVC phase out

The drawers manufactured by BK are made of chipwood covered by plastic film. In 1985 IKEA, following a Greenpeace campaign, demanded PVC-free furniture and subsequently, BK tried to phase out PVC. It was necessary to do some development work in co-

operation with the film manufacturer and the supplier of the production machinery. PP was tested successfully as replacement, but for a long time, there were still minor problems with the new material. Nowadays, 35% of production are produced PVC-free. Specially white products are good in PP, coloured or printed films are harder.

Initiative: Avoidance of tropic wood in production

Mahogany was used in production until some years ago, when the issue was raised in the media and customers began asking questions. There are no mahogany-products for the German market being made anymore. But on demand there are still some for the EU and foreign markets. They account for about 2 % of all wood inputs.

Initiative: Surface Treatment with Natural, Solvent-Free Materials

Since the beginning, the company owners have been using oil based priming or water based stain to pre-treat the wood, and wax or natural resin oil finish instead of varnish. The supplier of this material is an eco-retailer in Mainz which also gives advice with respect to the materials attributes and conditions of use. The relationship with the eco-retailer is very satisfactory. Even in economic terms processing such materials is considered to make sense since some equipment (like exhausting facilities) which otherwise have to be invested in, is not necessary.

Initiative: Real Wood from Sustainable Managed Forests

To process only solid wood from sustainable managed forests is also a decision made by the company's founders which they agreed upon in the course of establishing the joinery in 1993. There are two suppliers: a co-operative society and some wood traders. Regarding the first, the relationship was described as working without any problems. The interviewee especially highlighted the good information and advice the company gets from this supplier. Because of the absence of this aspect, the collaboration with the wood traders on the contrary is not valued very highly. So sometimes it is impossible to get accurate information about the origin and sustainability of the wood offered. Though this kind of material is much more expensive (plus 50 %) than the one that is usually manufactured, ÖSVL does not suffer profitability losses because of the considerable demand for products made of solid wood from sustainable managed forests.

5.6.8 Eco-Design

Eco-design as a formal scheme was reported by 11 companies, 64% of the excellent firms, 23% of the compliance+ firms and 11% of the compliance firms.

	we did before	we started
durable products	15	13
use of recycled raw materials	3	6
natural/ ecological raw materials	10	11
Recycability	6	9
transport of products	10	7
Packaging	8	7
takeback and repair of products	11	11
lightweight construction	5	3
Timeless designs	13	10
Communication of eco-design aspects	1	6
Communication of product stewardship	5	9

Tab. 5.35: Aspects of eco-design before and after implementation of eco-design (FTF)

Besides recycability of materials and the use of recycled raw materials (closing the loop) mainly the communication rose after the implementation of the scheme.

Initiative: Eco-Design

Mr. CA, the leading product manager in 1990 to 1997, set up an eco-design initiative from 1991 to 1993. It was a team approach led by CA and a young eco-designer. In the team, two members of the engineering department, two advisors from IÖW and the eco-management were present. No plants or technical equipment were purchased but a software tool to document environmental information on materials was developed together with a software developing company. A pay-back period can´t be given. Problems occurred between environmental and safety targets in engineering. The main outcome was a number of new chairs which minimise material variety, weigh less and are comparatively good repairable. One of these products did contribute twenty percent of WWHs turnover the year after market introduction and had an average profitability .

Initiative: Ecologically Designed Kitchen Furniture

B. has been on the market with a kitchen design called „Nature Concept“ since 1994. The impact to develop a kitchen consisting of solid wood and with surfaces sealed with oil instead of varnish came from the market: on the one hand customers expressed needs for such an ecologically designed product, on the other hand a few rival firms raised competition pressure on B. through the introduction of ecological kitchen furniture. So the management decided to enhance its product program with an eco-kitchen. No problems occurred during the design and the production process. External advice came from the oil supplier, which helped B. to select the appropriate kind and taught the workers how to use it. Although the „Nature Concept“ products form only a very small part of B.´s overall turnover, the interviewee assumed that it has been a profitable investment (no information about its amount could be given). He mentioned four arguments for this assessment: the completion of the firm’s product range, an improved image of the company, a higher competitiveness and the excellent profit margin of the eco-kitchen (customers who want to buy ecologically sound products are prepared to pay comparatively higher prices).

Initiative: Founding of the company

The company was founded by eight carpenters (three women) with the intention to supply ecologically sound products. The principles of the company therefore are:

- use massive wood of regional trees (regional sorts),
- apply environmental friendly varnish (natural waxes and oils),
- environmental conscious mounting of parts, e.g. no use of polyurethane foams when installing windows but instead use of coconut fibres.

These principles reduce the environmental impact of the company from the beginning. It shall foster use of sustainable raw material and keep the negative environmental impact low. In deed, the solvent emissions are comparatively low (1 kg per year for machine cleaning and , in some cases, solvent varnish for clients).

5.6.9 Important environmental aspects

The scope of initiatives which was basis of the analysis was developed by looking on initiatives which are common in excellent firms and which are demanded by environmental legislation. Additionally, important environmental aspects of the product chain were analysed.

The initiatives in the questionnaire are representative for the activities of the sector. They contained the initiatives which are now part of general good management practices (like waste management) as well as advanced initiatives like environmental management and eco-design. But some of the important environmental aspects of the product chain were not targeted by measures of the furniture companies or cannot be tracked down from a specific initiative.

Before conclusions concerning policy advice can be drawn, it may be useful to look into the overall importance of the initiatives to solve actual environmental problems of the furniture chain.

To look closer into the question of interrelation of steps in the product chain, relevant institutions and environmental aspects, a special set of interviews could be arranged in cooperation with a project aimed at the development of an Integrated Product Policy. The work carried out in our project led to the proposal, to take wooden furniture as case study to pilot the Integrated Product Policy idea (results are published in Rubik 2000 and Hoffmann et.al.2000).

Six relevant institutions of environmental product policy and additionally four companies in the furniture chain have been interviewed in September and October 1999. They were asked about the importance of environmental problems of the furniture chain.

Interviewee	Environmental Aspect	Non-Sustainable Forestry	Tropical Hardwood from Non-Sustainable Forestry	Raw Material Supply Shortage for Solid Wood Furniture	Chemical Additives in Chipwood etc.	Emissions of Surface Treatment	Emissions during Use	Short Service Life
Company 1	A	B	-	A	B	B	-	C
Company 2	C	-	B	B	A	C	-	B
Company 3	C	C	A	B	B	C	C	B
Company 4	-	-	-	-	B	-	-	-
Furniture Manufacturers Association	B	A	-	A	A	B	B	A
Furniture Trade Association	-	-	A	-	-	C	-	-
Environmental Ministry	C	C	-	A	C	C	A	A
Environmental Protection Agency	C	C	-	A	B	A	B	B
Environmental NGO	A	B	-	C	-	C	-	-
Consumers NGO	B	C	-	A	-	A	A	B

A: very important environmental aspect; B: important environmental aspect; C: less important environmental aspect; -: no problem.

Tab. 5.36: Prioritising of environmental aspects by interviewees

It is interesting to see, that from a product chain point of view, only five of our eleven initiatives are of major importance. Formaldehyde free chipboard is targeting chemical additives in chipwood, solid wood will prolong service life and, perhaps, lead to more sustainable forestry. Water based or powder coating and other solvent reduction measures reduce emissions from surface treatment and eco-design may have multiple results. This does not mean, that waste separation, recycling of packaging or energy conservation are not important on a national scale. But they are no aspects which are specific for the furniture sector. And environmental management system and reporting cannot be directly linked to environmental aspects.

The most important aspects not directly contained in our questionnaire are the service life of products and the recycling of used furniture. But the first may be prolonged by good (eco-) design and recycling can also be made easier by (eco-) design.

The results of these interviews show, that environmental policy is, up to now, not developed in view of the whole product chain. The following diagram links relevant institutions to steps of the product chain, in which they are interested. It shows, that no single institution really has an integrated approach and an interest to minimise the environmental impact over the whole product chain. This can be tolerated for groups, which are only involved in specific steps of the chain, e.g. consumers-NGOs or manufacturers. It can not be tolerated for the Environmental Ministry and the Environmental Protection Agency. These organisations should try to look at the whole product chain and act in the interest of an overall sustainability of the product system from cradle to next cradle.

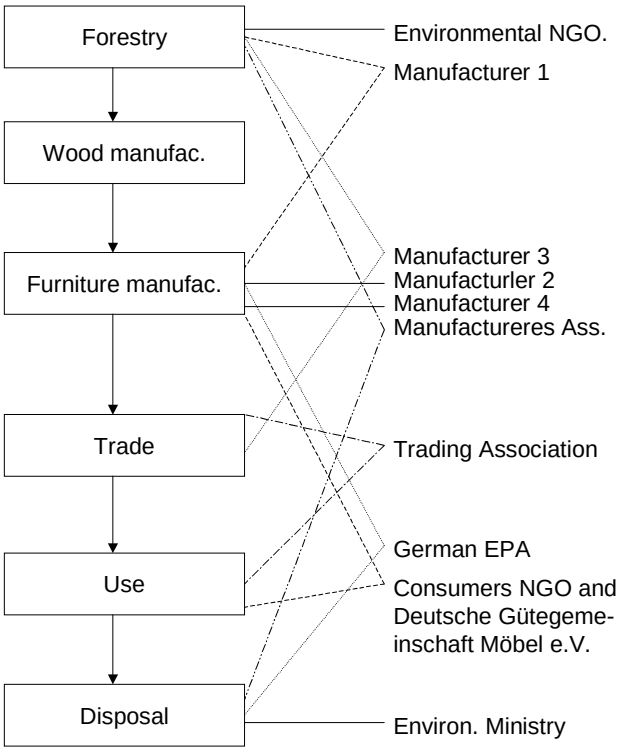


Fig. 5.10: Product stewardship as seen by the interviewees

Also the fact, that the Guidelines "Environment and Healthy Living" of the Deutsche Gütegemeinschaft Möbel e.V., a sector association defining quality requirements for "good furniture", do only focus on health aspects does not really satisfy. The long list of possible contaminants reminds us of the Ökotex Standard 100, which has a similar position in the textiles market. These labels use the fact, that health is more important to people than the environment. But since "environment" sounds good, they are named "environmental standards". The positive result of these guidelines may be, that phasing out toxics out of product chains for health reasons also causes "positive external environmental effects". But the environmental part of the guideline is too general and is not certifiable.

And even after the recent "restructuring" the "Blue-Angel" for furniture (www.blauer-engel.de) still focuses very much on health aspects. There are now some provisions for prolonging service life, but a five year warranty for the supply of spare parts still is not a convincing idea in a market, in which product life might be 200 years.

5.7 The focus group

The focus group was carried out at the „Hauptverband der Deutschen Holz und Kunststoffe verarbeitenden Industrie" (Association of German Wood and Plastics manufacturing Industry) on march 21st 2000. The participants were employees of the association including the general manager. From IÖW, Jens Clausen and Willi Konrad took place.

The meeting lasted about two hours. It was documented by tape recording and than transcribed.

The first draft of this report had been sent to the participants in advance. As introduction, a small presentation of the main results had been made. The talk focussed on a coupled of issues and sometimes moved between issues. The empirical results of the projects were not really commented. But no single result was critisised as being not possible. The following text summarises the main results.

Furniture trade as a gatekeeper of ecological innovation

The market of furniture is a national market. The (low) export mainly goes to 80% to German speaking countries within the EU and is, in the view of the participants, no real export. The trade is dominated by some huge trading firms. 80% of the turnover of the German furniture industry is made with members of procurement associations of trading firms. They have enormous power. If e.g. a furniture manufacturer should start an e-commerce initiative to market ecological products at higher prices with a lot of information available to the final customer, he would probably be boycotted by the procurement associations and loose the best part of this clients and get into serious difficulties.

The participants doubted, that final customers would get information about ecological product features, let alone environmental conscious production, from the trading firms. The furniture trade usually mixes high and low quality products and sometimes profits by selling cheap furniture might be higher than selling expensive products. The trade therefore has no interest in communicating too much quality differences to the final customer. Years ago, an ecological product information card had been developed to be glued at the back side of the furniture and inform the final customer about materials used. This was strictly refused by the trade firms.

The result is, that the ecological value of products cannot be transferred into higher market prices if firms sell to traders. (Project result: Only small carpenters workshops, which sell direct to final customers, seem to get there ecological ideas paied for.) Trade seems to be a major hindrance to a free market in which a final customer may have access to information and freely decide what to buy.

Management of furniture firms and market change

Many small companies have a very old management. Old men, who founded the company 40 years ago, are still the deciders. These men started crafts-workshops and have undergone years of growth. They are not really qualified to manage big enterprises. Their childs, if they join the firm at all, may not have much influence.

In the current situation, many of these firms are manufacturing medium price furniture (about 50% of the market). The association expects, that in future, this part of the market will be rapidly shrinking and leave a higher percentage of high value furniture (including some ecological features) and a high percentage of very cheap furniture. Many of these medium price firms will have to undergo a process of change. Either they innovate, concentrate on their products, market profile and image and target the higher price segment, or they concentrate on cost reduction and efficiency and target the cheap furniture market.

But this process of change as well as modern management ideas might only be introduced when the young generation takes over, which can be too late. Targeting firms by policy with the idea of upgrading management is therefore totally useless as long as the old men are still the managers and no real change is intended. It might be possible, to offer the young generation help when they take over the firm and try to catch up with mar-

ket requirements. One participant saw the possibility, of “lending” advisers to firms for a limited time to help in change processes.

Market change and ecology

Form time to time, obvious environmental problems are solved by furniture industry. In the 90th, the formaldehyde problem – due to market pressure - was solved (cheap imports from east Europe excluded) and in the moment, the VOC problem – due to political pressure - is targeted.

Tropical hardwood is still seen by participants as a problem. There was an approach by the association to indicate “sustainable tropical hardwood” which was overrun by the FSC and opposed by the trade. After all, nothing came out of the initiative.

A tendency to massive wood is not seen. The market share of massive wood remains more or less constant since years. But it might as well be possible, that furniture production identifies more as a woodworking industry with a neutral CO_2-balance to prove its sustainability.

It is expected by participants, that a growing percentage of high price furniture will make some ecological improvements possible. But in many cases, the selling argument will be better health qualities of the products (no health affecting contents), but with positive environmental results. Environmental problems, e.g. tropical hardwood, without health risks are such less likely to be solved. Many customers mention quality and design to be more important than price. To use these values to foster sales of environmental conscious furniture, the information problems (trade, see above) must be overcome. Co-operation in the whole product chain would be a good possibility.

6 Findings for the Textile Finishing Industry

6.1 The business situation of the firms

Compared to its reputation to have been the first industry against the wall when globalisation comes, the FTF sample firms in textile industry are doing reasonably well. 66.7% expect a profit or a good profit in 2000. Only 10.0% expect a break-even and 23.3% a loss. 43.3% expect a growth in sales, 26.7 stability and 30.0% a fall in sales. Reasonably well also means, that apparently most companies have accommodated to a bad situation, e.g. by extremely low investment ratios. On average 76.1% of all machinery was older than 5 years, 51.2% even older than 10 years. Many company premises showed little maintenance, and often interviewees stated, that the expensive and key machinery was especially old, even more often if the company was specialised in dying or printing. Due to the differing focus of our questionnaire this 'impression' cannot be quantified, though.

Age of machinery	Av. Percentage
< 2 years	9.7
< 5 years	15.9
< 10 years	24.9
> 10 years	51.2

Tab. 6.1: Average percentage of machinery by age group

The most important factors of competitiveness as seen by the interviewees are given in table 6.2. The factor distribution reflects quite accurately the "general notion" as presented by most texts about the textile industry. Quality and price are the dominating factors with about the same respective importance. Following further behind are a number of "everyday motivators": speed of delivery, service, variety. Least important are factors with an indirect contribution to service quality: the environment and availability of counselling.

As all sample firms are SME's, substantial degression effects are far out of reach, and thus only one company reportedly follows a cost leadership strategy, while the other companies divide evenly between differentiation and focussed strategy (50% and 46.9%, respectively). Focussing happens usually with respect to products, and rather not in terms of key processes. Often, and contrasting with our experience from the furniture industry, companies were able to name their (few) competitor SMEs. This, again, does not apply to most printing and dying firms.

Factor	Advantage			
	1.	2.	3.	Sum
Quality	13	10	2	25
price	13	8		21
Speed of delivery	2	3	2	7
service	1	2	8	11
Variety		1	6	7
Labour supply		1	2	3
Labour quality		1	4	5
Capital availability		1	1	2
marketing		1		1
suppliers			1	1
environment				0
availability of counselling				0

Tab. 6.2: Factors for competitiveness (FTF)

As for the postal sample in 1998 52.1 % of the companies of the sample had numbers of employees ranging from 1 to 50 people. 39.5 % of the firms employed 51 to 250 people, whereas only 8.4 % employed more than 250 workers. When compared to the situation in 1993, these numbers reflect a growing share of smaller firms and a decreasing share of larger companies. Consequently, the observed firms employed 123.5 persons on average (total: 7.904) in 1993, whereas the average firm only employed 95.6 people in 1998 (total: 6.789). This development is due to the already mentioned fact that the German finishing industry has been faced by unfavourable economic circumstances for many years.

Furthermore, this observed tendency is confirmed by the firms' statements on profitability and on value-added per employee. Although 50 % respectively 71.4 % of the companies regard their profitability and their value-added per employee as 'on the average', there are clearly more firms below the average of the industry sector than above. In this context, the economic situation of firms employing more than 100 workers is slightly more favourable than the one of those employing less than 100 people, as tables 6.3 and 6.4 demonstrate:

Profitability	Number of firms	% of firms	% of firms 1-99	% of firms 100-500
Below average	24	33.3	35.6	29.6
Average	36	50.0	48.9	51.8
Above average	12	16.7	15.5	18.6
Total	72	100.0	100.0	100.0

Tab. 6.3: Firm profitability and firm size

Value-added	Number of firms	% of firms	% of firms 1-99	% of firms 100-500
Below average	14	20.0	21.9	17.2
Average	50	71.4	70.7	72.4
Above average	6	8.6	7.4	10.4
Total	70	100.0	100.0	100.0

Tab. 6.4: Value-added per employee and firm size

The sample firms are making 17.9 % of their turnover in foreign markets (11.4 % within the EU, 6.5 % outside the Union); 31.9 % of the turnover are stemming from sales in the home region of the companies and 50.2 % from sales in the national market. As far as exports are concerned, it becomes obvious that 22 companies do not export at all, that 19 companies only sell up to 10 % of their products outside the German border, and that merely 7 firms have an export level of more than 50 %. Considering this weak export rate, the German finishing industry can be characterised as a branch which is predominantly focused on the national and regional market. And indeed, the sample contains a number of 36 respectively 22 firms which are acting primarily on the national and regional level.

Sales regional		Sales national		Total exports		Export within EU		Exports outside EU	
% of sales	No. of firms	% of sales	No. of firms	% of sales	No. of firms	% of sales	No. of firms	% of sales	No. of firms
0	20	0	7	0	22	0	22	0	36
1-10	21	1-10	6	1-10	19	1-10	26	1-10	25
11-20	2	11-20	5	11-20	10	11-20	12	11-20	4
21-30	1	21-30	7	21-30	4	21-30	5	21-30	2
31-50	6	31-50	11	31-50	10	31-50	5	31-50	3
51-70	7	51-70	13	51-70	5	51-70	1	51-70	
71-90	6	71-90	16	71-90	2	71-90	1	71-90	1
91-100	9	91-100	7	91-100		91-100		91-100	
Total	72	Total	72	Total	72	Total	72	Total	71
Regional sales in % of total sales	31.9	National sales in % of total sales	50.2	Export in % of total sales	17.9	Export within EU in % of total sales	11.4	Export outside EU in % of total sales	6.5

Tab. 6.5: Regions of Activity

It is now possible to rank the different sample firms according to the strength of their market position on the basis of the data of the regions of activity. In order to determine the ranking of the firms' competitiveness, it is necessary to split them into 5 groups, ranging from a low level of national sales to high export rates.[10] This analysis reveals the fact that

[10] Group 1: no exports, national sales = 0 % - 10 %; group 2: no exports, national sales = 11 % - 100 %; group 3: exports = 1 % - 9 %; group 4: exports = 10 % - 19 %; group 5: exports = 20 % - 100 %

the sample firms can be divided roughly into two competitiveness groups of nearly the same size: 33 companies rank low and 37 companies rank high (see Table 6.6).

When observing the relationship between competitiveness and firm size, it becomes clear that even smaller companies are selling products outside Germany, and that with a growing number of employees the portion of companies without any exports or with poor export rates is diminishing steadily. Except for one case, every firm with more than 50 employees is doing at least between 1 % and 9 % of its business in foreign markets.

			Employees of firms					
Competitiveness rank	% of firms	No. of firms	1-10	11-25	26-50	51-100	101-250	251-500
No exports, national sales = 0% - 10%	14.3	10	4	3	2	-	-	1
No exports, national sales = 11% - 100%	14.3	10	7	2	1	-	-	-
Exports = 1% - 9%	18.6	13	-	2	2	4	5	-
Exports = 10% - 19%	15.7	11	1	4	2	2	1	1
Exports = 20% - 100%	37.1	26	-	4	2	4	12	4
Total	100.0	70	12	15	9	10	18	6

Tab. 6.6: Exports and firm size

6.2 The Output-Hypothesises

6.2.1 Environmental Performance Ranking

73 companies answered the postal questionnaire. Within a framework of 11 types of initiatives, they mentioned 454 initiatives which is an average of 6.22.

To build a basis for cross tabulating the environmental performance of firms with other factors it is necessary to rank the firms according to their environmental performance. We formed the three groups **compliance** (0 - 2 initiatives), **compliance plus** (3 - 5 initiatives) and **excellence** (6 - 11 initiatives).

Rank	Number of firms	% of firms	Average number of initiatives
Compliance (0 – 2 initiatives)	9	12.3	1.2
Compliance plus (3 – 5 initiatives)	18	24.7	4.5
Excellence (6 or more initiatives)	46	63.0	7.9
Total	73	100.0	(Max. 11 initiatives)

Tab. 6.7: Environmental performance ranking (PQ)

Only 12.3 % of the firms are members of the group “compliance”, but nearly the fivefold quantity of companies have an environmental performance that is excellent.

At large, the FTF-data shows the same tendencies as the PQ-data. The majority of firms belongs to the compliance+ and excellence groups. However, the dominance of excellence firms is not as pronounced as in our postal survey. Upon close examination there are distinctive characteristics of compliance firms, which set them apart from the other groups other than their ranking score[11].

Of the compliance group, two cases were the only finishers of technical textiles (antistatic fabric for computers and fabrics for car seats), two small-scale T-shirt-printers and a post-finisher whose dominant input is hot steam. Practically every single real member of the clothes chain is rated either compliance+ or excellence.

Rank	Number of firms	% of firms	Average number of initiatives
Compliance	6	20	3,7
Compliance plus	11	36,7	6
Excellence	13	43,3	7
Total	30	100	6

Tab. 6.8: Environmental performance ranking (FTF, max. 8 initiatives)

6.2.2 Relationships between Environmental Performance and Economic structure- and performance-indicators

There is a distinct relationship between firm size and environmental performance insofar as the portion of firms belonging to the “excellence” group is increasing with growing firm size.

[11] Ranking scheme see chapter 2.1.1

	Rank	1-10	11-25	26-50	51-100	101-250	251-500	All responses
No. of firms	compliance	6 (50.0)	1 (6.3)	1 (11.1)	-	-	1 (16.7)	9 (12.7)
	compliance +	3 (25.0)	6 (37.5)	2 (22.2)	3 (30.0)	3 (16.7)	1 (16.7)	18 (25.3)
	excellence	3 (25.0)	9 (56.3)	6 (66.7)	7 (70.0)	15 (83.3)	4 (66.7)	44 (62.0)
	total firms	12	16	9	10	18	6	71

Tab. 6.9: Environmental performance and firm size (PQ)

Larger companies do not only have a better environmental performance than smaller ones, they are also in a better position as far as economic parameters are concerned. Therefore a positive relationship between economic parameters and environmental performance can be assumed: the better the first variable, the better should be the latter correspondingly. In this context it becomes obvious however, that firms belonging to the "excellence" group, can be the majority in absolute and relative terms (see tables 6.10 to 6.12), which makes clear that an excellent environmental performance does not necessarily depend on good economic performance.

Rank	compliance	compliance +	excellence	All responses
below average	2 (22.2)	5 (29.4)	17 (37.0)	24 (33.3)
equal to average	6 (66.7)	9 (52.9)	21 (45.6)	36 (50.0)
above average	1 (11.1)	3 (17.7)	8 (17.4)	12 (16.7)
Total firms	9	17	46	72

Tab. 6.10: Profitability and environmental performance (PQ)

Rank	compliance	compliance +	excellence	All responses
below average	3 (33.3)	1 (5.9)	10 (22.7)	14 (20.0)
equal to average	6 (66.7)	13 (76.5)	31 (70.5)	50 (71.4)
above average	-	3 (17.7)	3 (6.8)	6 (8.6)
Total firms	9	17	44	70

Tab. 6.11: Value-added per employee and environmental performance (PQ)

Rank	compliance	compliance +	Excellence	All responses
No exports, national sales = 0% - 10%	3 (33.3)	2 (11.1)	5 (11.4)	10 (14.1)
No exports, national sales = 11% - 100%	4 (44.4)	4 (22.2)	3 (6.8)	11 (15.5)
Exports = 1% - 9%	-	2 (11.1)	11 (25.0)	13 (18.3)
Exports = 10% - 19%	1 (11.1)	2 (11.1)	8 (18.2)	11 (15.5)
Exports = 20% - 100%	1 (11.1)	8 (44.4)	17 (38.7)	26 (36.6)
Total firms	9	18	44	71

Tab. 6.12: Exports and environmental performance (PQ)

There are some facts from our face-to-face-interviews supporting our hypothesis, that firms with a good environmental performance will also show above average performance in economic terms, yet a number of plausible indicators show no clear tendency. It should not surprise too much that, for example, most correlations fail to support significant tendencies. With our given (small) sample size we must ultimately fail to prove or even discover weak influences. Ambiguous influences are a problem, too, because we have to split up our sample further to find, e.g. linear relationships that change their gradient angle or even direction from one segment to the other. Nevertheless, a number of facts that lead to interesting conclusions have been found.

The crosstabulation of firm size and env. performance supports the notion derived from our postal questionnaires, that bigger firms (100+ employees) show a better environmental performance than smaller firms (<26 employees). However, one has to bear in mind that for example an (environmental) management system can increase the performance score by 12 points if no (internal or external) environmental communication was made before its implementation. Yet a management system shows under-proportionately rising costs with respect to firm size. Thus, it will be relatively more affordable for bigger companies and this improved affordability will lead to higher performance within our evaluation framework.

	Rank	1-10	11-25	26-50	51-100	101-250	251-500
No. of firms	Compliance	2	1	1	1	1	0
	compliance +	1	2	2	2	2	2
	Excellence	0	1	3	2	6	1

Tab. 6.13: Environmental performance and firm size (FTF)

This is to say that firms appear more prone to show good environmental performance because they are larger than others, not vice versa. No single firm could be found, which grew from small to large because of a successful eco-strategy.

A look at the export levels in the performance groups (see table 6.14) allows a further differentiation. Until now, we more or less discussed textile finishers as a rather homogenous group apart from their environmental performance. Yet our discussion of the sample

structure hinted towards a product-oriented distinction between finishers as e.g. all finishers of technical textiles fall into the compliance category. If we keep that in mind, it seems appropriate to relate the (quite incredibly) high exports of the compliance group to different products. Technical textiles require substantially higher innovative power with respect to functional innovations (to set them apart from "fashion innovations" required in the clothes-chain). It should therefore be relatively more feasible to produce them in "High skills and labour costs – Europe", even supplying world markets.

Export Rank	Compliance	Compliance+	Excellence	Total
No Exports, national sales 100%	2	5	4	11
Exports = 1%-9%	2	2	2	6
Exports = 10%-19%	1	1	1	3
Exports = 20%-100%	2	4	5	11
Av. Export Rating[12]	158 Pts.	99 Pts.	109 Pts.	116 Pts.

Tab. 6.14: Exports in the Performance Groups

The distribution of exports between the compliance+ and excellence groups supports our notion that high environmental performance has a positive influence on competitiveness without exactly delivering proof. The average export rating of the excellence group is almost 10% higher than in the compliance+ group. Compared to the compliance+ group, there is one more excellent company in the highest exports category and one less in the lowest. However, there is not even within environmental performance groups a significant correlation between export rating and environmental ranking score (see table 6.15). This is also true for changes in employment; companies with good environmental performance are neither better nor worse generating jobs than other companies. Yet it should not be forgotten that creation of jobs has more to do with expectations than with factual performance data. This is also true for our survey: there is substantial evidence that environmental performance improves productivity and quite probably value added (both calculated per employee).

From group to group, the correlation between productivity, value-added and ranking score increases. This is an indication that the marginal return on investment may be increasing with increasing environmental performance.

Indicator	Compliance	Compliance+	Excellence	Total
Export Rating	not significant	not significant	not significant	not significant
Percentual change in employment (99-94)	not significant	not significant	not significant	not significant
Productivity per employee	not significant	0,458 Sign. 0,156	0,634 Sign. 0,027	not significant
Value-Added per Employee	not significant	not significant (0,341/ Sign. 0,335)	0,707 Sign. 0,022	not significant

Tab. 6.15: Correlations between Environmental Performance (Ranking Score) and Economic Performance Indicators

[12] Defined as: (regional sales*0) + (national sales) + (EU sales*2) + (non-EU-Europe*3) + (other countries*4)

In the light of a statement of interviewee 633 this does not seem far-fetched: he stated that the introduction of their environmental management system had not been very promising. They had a lot of accompanying workshops for all employees to let the new philosophy sink in. But there was at first little output in terms of improvement ideas and induced productivity increases. However, after a period of approximately 2 years, a lot of employees came up with new ideas although there had been no reported change in incentives. The interviewees explanation was a time lag between cultural change, the application of this new way of thinking to practical problems and finally coming up with solutions fueled or even made possible by such a change of perspective.

On top of that, there is yet another economic performance indicator that shows a strong relationship to environmental performance: the average age of machinery. While there is little difference between the machinery age distributions of compliance and compliance plus firms, the machinery of the excellent firms is substantially newer (see table 6.16). Excellent companies have 4 times as much machinery below 2 years of age and twice as much between 2 and 5 years of age. As excellent companies can afford buying much more new machinery than companies with average or below average environmental performance, their liquidity problems should be much less pronounced and in fact they are, since only 46% of the excellent firms mention capital problems to be important while 76% of the c and c+ firms mention capital access to be a problem (see table 6.46).

Age of machinery	Av. Percentage Compliance	Av. Percentage Compliance+	Av. Percentage Excellence	Av. Percentage Total
< 2 years	4.6	5.2	15.9	9.7
< 5 years	14.4	11.8	20.2	15.9
< 10 years	20.0	23.4	28.4	24.9
> 10 years	67.5	59.6	35.5	51.2

Tab. 6.16: Average percentage of machinery by age group and environmental performance group

As all companies argued that they can't demand higher prices for greener products, excellent companies must be better at turning revenue into profit – or at least available funds. The business success in the FTF was measured by some additional indicators. The following table shows these indicators cross tabulated with the environmental performance groups.

	Compl	Compl+	Excell	All Firms
Av. Turnover (T. Euro)	6.250.000	9.800.000	8.760.000	8.720.000
Av. Productivity per capita (Euro)	116.000	72.000	69.700	78.700
Av. Value Added per capita (Euro)	53.000	50.000	51.000	51.000
Av. Level of exports %	16,5	15,2	18,9	17,0
Av. Employment 1999	57,8	110,0	115,4	101,9
Av. Employment Growth 1994-1999 per year in %	-3,5	-7,2	-3,2	-5,3
Percentage of firms in the group growing in the last five years	17	27	46	33
Percentage of firms in the group expecting growth in the forthcoming three years	50	45	38	43
Av. Development Staff %	0,0	2,0	5,0	3,9
Av. Qualified Staff / Staff %	51,8	46,7	57,6	52,1
Av. Worker Wage (Euro per hour)[13]	11,2	9,6	9,8	10,0
Av. Age of machinery (years)	11,8	11,2	8,3	10,1
Sample Size	6	11	13	30
Av No of Initiatives	3,7	6,0	7,0	6,0

Tab. 6.17: Environmental Performance (Ranking Score) and Economic Performance Indicators

Additionally, we asked for expectations in the forthcoming years. 43% of the firms expect growth, 26% stability and 30% shrinking. Two thirds of the firms expected a profit in 2000, 10% expect a break-even and 23% a loss.

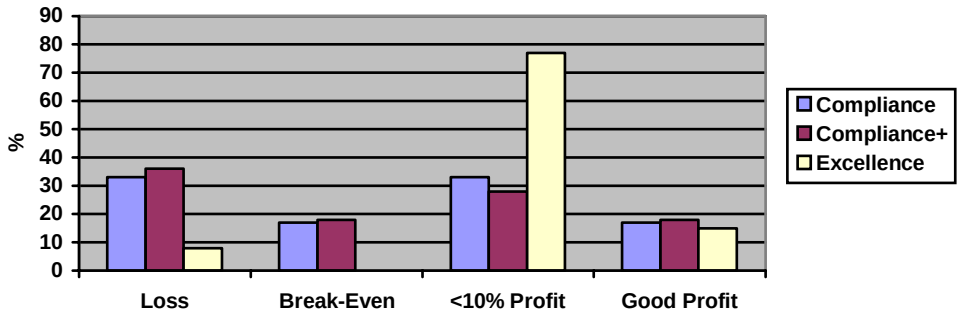


Fig. 6.1: Percentages of the groups and their expected profit levels

The profitability of the excellent firms seems to be higher than the compliance and compliance+ firms. But looking on the other indicators, there is no clear picture showing one of the groups to be better off than the others. The level of environmental initiatives does not seem to be of a high influence on firm competitiveness.

[13] Wages data only from part of the firms.

It could be argued that the effects shown are only a result of the bigger size of compliance+ and excellent firms compared to compliance firms. A matched pairs analysis of 11 pairs of compliance+ and excellence firms of similar size and product range resulted in the following table:

	Compl+	**Excellence**
Av. Turnover (T. Euro)	9.800	8.300
Av. Turnover per capita (Euro)	72.000	74.800
Av. Value Added per capita (Euro)	50.000	49.500
Av. Level of exports %	15,2	14,3
Av. Employment 1999	110	111
Av. Employment Growth 1994-1999 in % (based on sum values for the group)	-41,8	-21,3
Av. Employment Growth 1994-1999 in % (based on individual percentages)	-7,2	-3,2
Percentage of firms in the group expecting growth in the forthcoming three years	45	36
Percentage of firms in the group expecting profit in the next year	45	91
Av. Development Staff %	2.0	4,3
Av. Qualified Staff / Staff %	46,7	57,1
Av. Age of machinery (years)	11,2	8,0
Sample Size	11	11

Tab. 6.18: Environmental Performance (Ranking Score) and Economic Performance Indicators of eleven matched pairs

The profitability of the excellent firms within matched pairs seems to be considerably higher than the compliance+ firms. Measured against the indicators growth and profitability, development staff and age of machinery the analysis of matched pairs shows that environmental initiatives have a positive economic effect. But regarding turnover and added value as well as exports no differences in performance can be identified. In principle, these results do not vary from the results which were obtained by comparing the complete performance groups.

6.2.3 Impact-evaluation of environmental initiatives by the sample firms

Relating performance-indicators to each other is a valuable method of generating more or less objective information about respondents' behaviour. However, to achieve a higher degree of predictability as well as adequacy of policy-advice, it is necessary to depict the point of view of our interviewees.

They were asked to express their perceptions e.g. of the consequences of the undertaken environmental initiatives and the most influential driver in the initiatives' adoption. One has to be careful about the degree of subjectivity of these statements, but they should reveal possible starting points for policies in this economic sector.

To discuss strategies and attitudes is one thing, to take a look at concrete environmental measures, however, is another necessary step. Doing so, one can observe that 73 companies in the postal survey mentioned a total number of 454 initiatives. The average num-

ber of initiatives per firm therefore is 6.22. Only 3 firms did not adopt any initiative at all in the past, whereas nearly 50 % of the 73 companies carried out between 5 and 7 environmental initiatives.

No. of initiatives	% of firms	No. of firms	Total no. of initiatives
0	4.1	3	0
1	1.4	1	1
2	6.8	5	10
3	2.7	2	6
4	6.8	5	20
5	15.1	11	55
6	17.8	13	78
7	15.1	11	77
8	9.6	7	56
9	6.8	5	45
10	5.5	4	40
11	8.2	6	66
Total	100.00	73	454

Tab. 6.19: Number of Environmental Initiatives (PQ)

The degree of diffusion of the single types of initiatives is slightly different (see table 6.20) with waste separation being mentioned by almost the whole group of our sample firms. It is striking however that even with regard to the other initiatives - with the exception of environmental management and integrated heat/water efficiency - a widespread usage can be stated. It is of great interest now to analyse the factors referred to by the companies as the drivers behind all the environmental measures. In this context the ranking is quite clear: cost constitutes the main reason (in 6 cases), three initiatives were predominantly conducted for market reasons and two initiatives - the most widespread ones! – were carried out with the main driver being compliance with regulations.

Initiative	Number of firms	% of firms	Main reason	Two main reasons
Waste separation	70	95,9	Regulation	Reg. 42 Cost 29
Chemical substitution	52	71,2	Regulation	Reg 37 Market 20
Chemical use reduction	51	69,9	Cost	Cost 30 Reg. 12
Reuse of waste	48	65,8	Cost	Cost 37 Reg. 13
Energy efficiency	43	58,9	Cost	Cost 40 Reg. 2 Market 2
Water efficiency	43	58,9	Cost	Cost 32 Reg. 8
Product labelling	40	54,8	Market	Market 33 Cost 7
Process change	37	50,7	Cost	Cost 29 Market 8
Co-operation	33	45,2	Market	Market 19 Cost 12
Environmental management	19	26,0	Market	Market 14 Reg. 5 H&S 5
Integrated heat/water efficiency	17	23,3	Cost	Cost 13 Reg. 3

Tab. 6.20: Kind of Initiative and Main Reasons (PQ)

As far as the influence of the four drivers is concerned, one can draw nearly the same picture as above by counting how often each factor was mentioned: cost was mentioned 238 times as a reason for an initiative, regulation 139 times and market 114 times. Only with regard to health and safety, which was referred to 58 times as a reason, one can say that this factor has at first glance a low relevance. However, the textile finishing business is handling a lot of hazardous chemicals. Types of industry doing so are extremely regulated in the field of health and safety. Since regulation is always mandatory we think, that health&safety was of course considered, but only implicitly.

It is one of the most common arguments of optimistic environmental and economical researchers regarding investments in environmental measures that such expenditures will lead to benefits in both environmental as well as economic terms (win-win-situation). And indeed, the firms responding to the German short questionnaire confirm this assumption.

Initiative	Labour		Costs		Sales		Profits		Productivity	
	Up	Down	Up	Down	Up	Down	Up	Down	Up	Down
Waste separation	31	-	29	15	3	1	5	18	-	11
Chemical substitution	10	4	27	3	14	6	4	19	2	8
Chemical use reduction	7	3	5	27	6	-	16	5	3	2
Reuse of waste	20	1	7	24	2	2	13	8	1	7
Energy efficiency	5	5	4	30	2	2	25	1	6	1
Water efficiency	8	3	3	29	-	-	17	2	2	2
Product labelling	12	3	20	2	19	1	4	13	1	3
Process change	7	5	8	19	7	1	16	3	12	1
Co-operation	7	1	8	5	11	-	6	7	5	1
Environmental management	4	4	10	2	7	-	3	6	2	2
Integrated heat/water efficiency	4	3	2	10	-	1	6	1	3	1
Total	115	32	123	166	71	14	115	83	37	39

Tab. 6.21: Economic Impact of Environmental Initiatives (PQ)

In general, environmental initiatives of the PQ sample cause additional labour (115 up, 32 down). But the impact on cost is not unidirectional (123 up, 166 down). The answers concerning productivity do not lead in a specific direction. Sales and profits show in more cases a positive than a negative development.

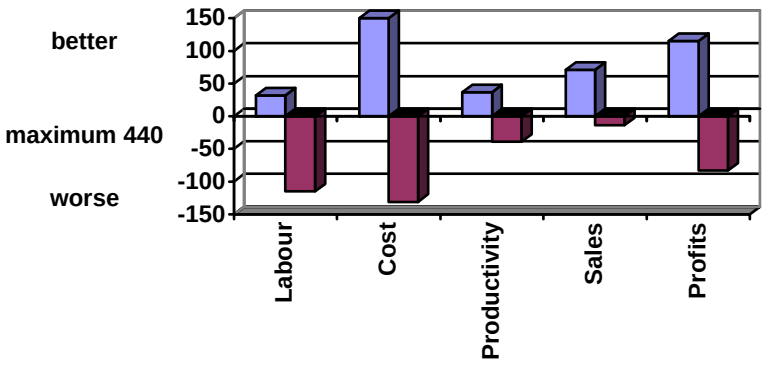


Fig. 6.2: "better" or "worse" weightings summed up for all initiatives (PQ)

Focussing on specific initiatives, the first thing to catch one's eye is the cost increasing impact of waste separation (see tables 6.20 and 6.21). This seems odd, because mixed waste is much more expensive to dispose of, so the amounts of additional labour should be well spent. Our explanation is that our respondents do not compare the alternative disposal policies under today's circumstances, but the historical situation before they had to separate their streams of waste with today's situation. This seems a questionable approach to design of business alternatives, but it might well be how our respondents evaluate what's happening. The next issue is a triad of sales increasing measures: product la-

belling, chemical substitution and co-operation along the supply chain. All these initiatives are however seen as either diminishing profits or as being at best neutral (co-operation). Then again, we have a set of efficiency-increasing initiatives, that are rated very positively (chemical use reduction, reuse of waste, energy efficiency, water efficiency and integrated heat/water efficiency. Our respondents clearly attribute rising profits via sinking costs to these initiatives. If we put these two pieces of information together, one might get the impression that the finishing industry clings to some extend to a sixties-style marketing approach, where all marketing was supposed to do was to "make the ignorant customer buy one's fine goods." This is to say that improving the marketability of products delivers value-added, because goods that are not adequate to customers' needs will remain unsold, supply being higher than demand – which is especially true for textile finishing. This leads to a somewhat patronising question: Why do so many firms in the finishing industry cling to a philosophy that makes them feel bad about initiatives which are essential for their survival?

Initiative	compliance	compliance +	excellence
Waste separation	6 (67%)	16 (84%)	44 (96%)
Chemical substitution	-	11 (58%)	40 (87%)
Chemical use reduction	1 (11%)	9 (47%)	38 (83%)
Reuse of waste	3 (33%)	10 (53%)	34 (74 %)
Energy efficiency	1 (11%)	8 (42%)	34 (74%)
Water efficiency	-	8 (42%)	34 (74%)
Product Labelling	-	6 (32%)	32 (70%)
Process change	-	6 (32%)	31 (67%)
Co-operation	-	2 (11%)	30 (65%)
Environmental management	-	1 (5%)	18 (39 %)
Integrated heat/water efficiency	-	-	17 (37%)
Total	11 (9 firms)	77 (18 firms)	352 (46 firms)

Tab. 6.22: Initiatives and environmental ranking (PQ)

Apart from that, a look on the relationship between environmental initiatives and environmental ranking clearly shows, "excellence" firms differ from "compliance" and "compliance plus" firms primarily due to the fact that they also conduct measures stemming from co-operation with other companies or organisational changes which are often complex in a technical sense. We are now taking a look on whether these tendencies are confirmed by the face to face data.

The Distribution of the numbers of initiatives across the firms shows roughly the same characteristics as the PQ-sample; very few companies fall into the low number–categories, there is a pronounced centre and well-filled upper categories. However, the 'centre' has moved slightly towards the upper categories (see table 6.23). Although this may just be a result of the fewer initiatives accounted for and the smaller size of the FTF-sample, it is also possible that there is a small bias towards more "environment-friendly" companies.

No. of initiatives	% of firms	No. of firms	Total no. of initiatives
0	0	0	0
1	3,3	1	1
2	0	0	0
3	3,3	1	3
4	10	3	12
5	20	6	30
6	10	3	18
7	43,3	13	91
8	10	3	24
Total	100.00	30	179

Tab. 6.23: Number of Environmental Initiatives (FTF)

As for the frequencies of and drivers for specific initiatives, there are some remarkable differences (see table 6.24). These may in part be due to the fact that the PQ- and FTF-questionnaires show slightly different approaches. Namely, some initiatives of the PQ are approached with a wider focus in the interviews, so that drivers are given for a number of initiatives, and it is not possible to relate the reported driver to a single initiative. On the other hand, most interviewees had access to additional information from the interviewer, which is not true for the respondents of the PQ. So, there may be some difficulty to distinguish between energy efficiency and integrated water/energy initiatives. Process energy plays an extremely important role for overall energy consumption, and wherever water is used as a medium in these processes, a lot of accessible energy will be in the waste water. This is why integrated initiatives played such an important role in the FTF-interviews, while singular energy efficiency measures (applied to heating, process heating and lighting) bear a substantially smaller importance to the interviewees.

Another striking difference is the greater importance of co-operation for the FTF-sample firms. Almost twice as many companies than in the PQ-sample show at least one (of three) aspects of co-operative behaviour. We believe that the figure of 90% may be closer to the truth than 43.8%, because German (clothing) finishers, due to their ever shrinking market, face a lot of pressure to be co-operative: participation in clients projects can create some degree of uniqueness for the relationship and eager supply of product information may be a signal of responsible behaviour with respect to usage of harmful substances.

Initiative	Number of firms	% of firms	Main reason	Two main reasons
Waste separation	29	96,7	Cost	Cost 18 Reg. 8
Co-operation, Env. Communication, Labelling	27	90,0	Market	Market 19 Reg. 3
Chemical substitution, Chemical use reduction, Process change	26	86,7	Market	Market 12 H&S 6
Water protection	25	83,3	Regulation	Regulation 13 Cost12
Energy efficiency	25	83,3	Cost	Cost 23 Reg. 1
Air Protection	11	36,7	Health & Saftey	H&S 5 Reg. 4
Environmental management[14]	10	33.3	Market	Market 4 Cost 2
Packaging	8	26,7	Market	Market 7 Cost 1

Tab. 6.24: Kind of Initiative and Main Reasons (FTF)

The drivers show the same tendencies as in the PQ-sample. Initiatives are carried out either because they save money or because they are pressured by the market (clients). Only the protection of water and air, often carried out by use of end-of-pipe technologies, is done mandatory by regulative or safety&health reasons.

Obvious is the importance given to the market as a driver of environmental initiatives (see figure 6.3). This applies to the initiatives optimising processes and products and also to the communication of efforts to clients.

As it seems, the firms willing to give an interview are more market-oriented than the firms in the PQ-sample. Yet the FTF-sample seems to draw the same relative amount of quotes from the other categories, so there should be no other significant difference.

For the FTF group, costs seem to be the most important environmental driver, closely followed by the market and with some distance, regulations and health and safety. There may be a strong connection between the regulation- and H&S-drivers. The firms' eagerness to reduce cost seems well adjusted to their shrinking industry (but this is, of course, always a prudent thing to do).

[14] Only companies were counted who had implemented a kind of "management system" in the sense of ISO 9000ff or 14001. The drivers were also given for implementations of environmental teams, env. managers, env. policies or programmes.

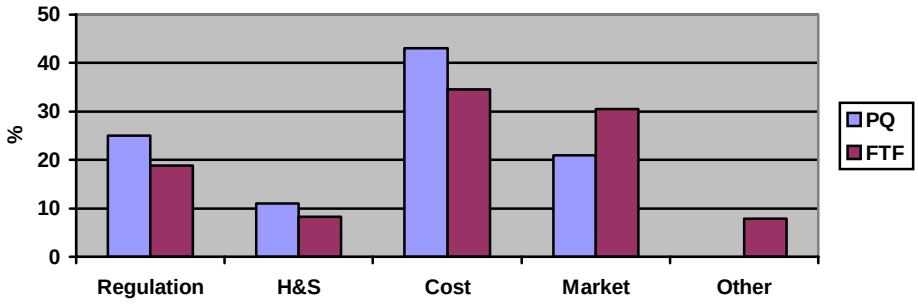


Fig. 6.3: Relative importance of drivers in PQ and FTF

This part of the analysis has again stressed the importance of the economic impacts of environmental initiatives. We have asked our respondents to comment on these economic impacts of a number of initiatives (see table 6.25). Only 213 "better" or "worse" weightings were made, but 1328[15] would have been possible. In fact, the interviewees gave "better" or "worse" weightings only in 1 out of 6 initiatives. The interviewees showed a quite remarkable tendency towards the statement "this aspect did not change at all". We suppose that they expressed their true feelings, but it should not surprise that SME (missing substantial controlling-capacities) quite often perceive mostly very obvious consequences, i.e. strong consequences with a short time lag. This is to say that one should not be too much exasperated about the relatively small number of quoted tendencies. In our opinion the remaining numbers reflect the more drastic cases. Their distribution should however be capable of delivering a good impression of the true effects.

	Labour		**Cost**		**Price**		**Sales**		**Posi-tion**		**Compe-tition**		**Profit**		**Image**		
	up	don	bet	wor	bet	wor	bet	wor	bet	wor	bet	wor	bet	wor	bet	wor	
Product labelling, Co-operation and Environmental Communication	1	0	2	10	4	2	4	0	10	0	15	1	4	3	11	1	**68**
Chemical substi-tution and use reduction, Proc-ess change	1	1	2	6	3	2	2	0	5	0	5	0	1	2	3	0	**33**
Energy efficiency and Integrated heat/water effi-ciency	1	0	12	0	3	0	3	0	2	0	3	0	7	0	2	0	**33**
Environmental management	1	0	3	1	0	1	2	0	5	0	5	0	3	0	5	0	**26**
Waste separation	0	0	7	1	2	0	1	0	1	0	2	1	3	1	3	0	**22**
Water protection	0	0	6	4	1	0	0	0	0	0	1	0	3	1	1	1	**18**
Air protection	0	0	0	4	0	0	0	0	0	0	0	0	0	2	3	0	**9**
packaging	1	0	1	1	0	0	0	0	0	0	0	0	1	0	0	0	**4**
Total	**5**	**1**	**33**	**27**	**13**	**5**	**12**	**0**	**23**	**0**	**31**	**2**	**22**	**9**	**28**	**2**	**213**

Tab. 6.25: Economic Impact of Environmental Initiatives (FTF)

[15] The companies carried out 166 initiatives and for each initiative, eight weightings would have been possible.

Three groups of initiatives may be identified from the FTF:

A. Energy efficiency initiatives as well as waste management tend to decrease cost and in some cases have subsequently a positive effect on profits.

B. Communication, labelling and product chain co-operation as well as chemical and process initiatives cost money, but foster image, position in the market and competitiveness. Environmental management is believed to do the same, but saves money. They can be characterised as market related.

C. Water and air protection as well as packaging initiatives take place for mandatory regulative or market reasons and have no considerable economic impact.

In all groups, there is a good correspondence between reasons and outcome of the initiatives.

All in all, environmental initiatives increase labour demand a little. They sometimes cost and sometimes save money. Yet they may pay back through increased sales in conjunction with a sometimes better product price. A better image, position in the market and ultimately competitiveness may be achieved. This in turn may increase profitability.

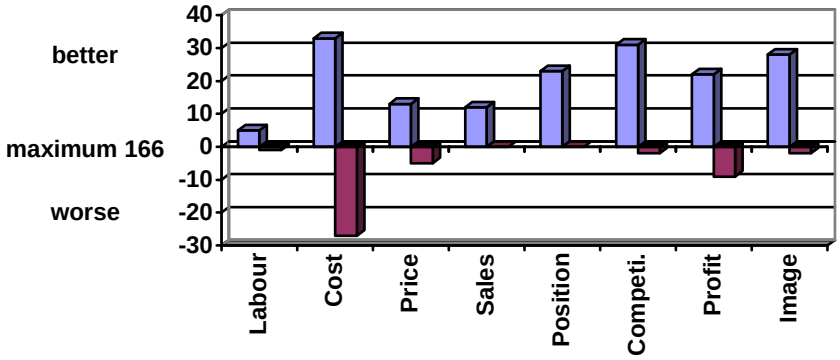


Fig. 6.4: "better" or "worse" weightings summed up for all initiatives (FTF)

Another story is the distribution of implemented initiatives across the environmental performance groups. The question here is "are there differences between our groups in how they earn ranking points?" (see table 6.26 and figure 6.5).

First of all, our conclusion from the furniture report, that excellent companies differ from other companies in implementing "integrated initiatives", i.e. initiatives that affect more than one aspect of environmental behaviour, are much more common with excellent companies. Examples were environmental management and Eco-design.

In textile finishing environmental management was reported for one third of all companies, but 61.5% of the excellent firms compared to 18.2% of the "compliance+"-firms and none of the "compliance"-firms.

Initiative	compliance	compliance +	excellence
Waste separation	5 (83%)	11 (100%)	13 (100%)
Co-operation	4 (66.7%)	8 (72.7%)	13 (100%)
Integrated heat/water efficiency	3 (50%)	9 (81.8%)	11 (84.6%)
Chemical substitution	3 (50%)	9 (81.8%)	11 (84.6%)
Water efficiency	1 (16.7%)	9 (81.8%)	12 (92.3%)
Process change	2 (33.3%)	7 (63.6%)	12 (92.3%)
Chemical use reduction	1 (16.7%)	7 (63.6%)	12 (92.3%)
Product Labelling	1 (16.7%)	9 (81.8%)	6 (46.1%)
Energy efficiency	2 (33.3%)	4 (36.4%)	6 (46.1%)
Environmental management	0	2 (18.2%)	8 (61.5%)
Total	22 (36.7%)	75 (68.1%)	104 (80%)

Tab. 6.26: Initiatives and environmental ranking (FTF)

Excellent firms, on the other hand, less commonly than the “compliance+”-firms use product-labelling. A reason may be that, as one interviewee put it, “Ökotex 100 was a big issue a couple of years ago. However, our demands have risen far beyond that, and it is not very useful anymore. We rather use our own specifications instead.” Also some stories show, that the Ökotex system is not completely credible (see chapter 6.10.7 “avoiding toxic substances”) and that might be an additional reason for advanced firms to use other systems.

A look at the initiatives concerning use of toxic substances unveils that this statement can be confirmed by our data: excellent firms are exceptionally active with respect to process changes and chemical use reduction, and they do not fall below their own average of activity concerning chemical substitution. They are again exceptionally active increasing the efficiency of water use, but their lead against the “compliance+”-firms is not very remarkable. Finally, excellent firms show in general more often co-operative behaviour than firms from other performance groups.

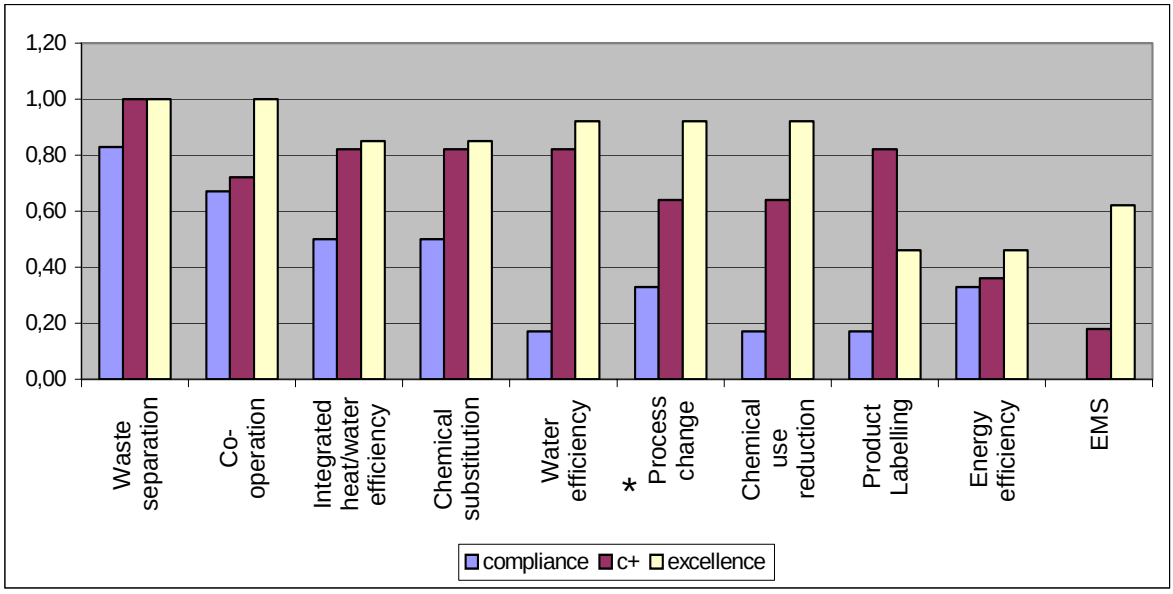


Fig. 6.5: Initiatives carried out by the performance groups (FTF)

6.3 The Input Hypothesises

6.3.1 Environmental Strategies and Attitudes

"Complying with regulations" and "reducing costs" are the most important strategic orientations with respect to environmental concerns. "Promoting the market image by offering eco-products" only followed in third position, whereas "developing new markets" was by far the weakest motivation for the companies of the sample.

Main focus	Number of firms	% of firms
Complying with regulations	43	58.9
Reducing costs	38	52.1
Improving brand image by eco-products	21	28.8
Improving brand image by eco-practices	15	20.5
Developing new markets	9	12.3
Not a relevant issue	5	6.8

(More than one answer was possible: N = 131)

Tab. 6.27: Environmental Strategy

On the one hand the environmental performance groups in table 6.28 largely are independent from the environmental performance of the firms. On the other hand their is a slight relationship between compliance and a main focus on regulation and between compliance plus/excellence and a main focus on promoting eco-products.

Main focus	Compliance	Compliance+	Excellence	All responses
Regulation	5 (45.5)	7 (26.9)	31 (34.8)	43 (34.1)
Cost savings	3 (27.3)	10 (38.5)	25 (28.1)	38 (30.2)
Promoting eco-products	1 (9.1)	4 (15.4)	16 (18.0)	21 (16.7)
Promoting brand image by eco-practice	1 (9.1)	4 (15.4)	10 (11.2)	15 (11.9)
Developing new markets	1 (9.1)	1 (3.8)	7 (7.9)	9 (7.1)
Total firms	11	26	89	126

Tab. 6.28: Environmental Strategy and Environmental Ranking

A different picture can be drawn by looking at the answers to the question of what constitutes the "most influential factor on final decisions on environmental issues". Again, regulation is the most important factor, but this time pro-active habits (customer demands and management awareness) clearly rank before costs.

Main influence	Compliance	Compliance+	Excellence	All firms
Regulation	5 (83.3)	4 (25.0)	20 (50.0)	29 (46.7)
Customer demands	1 (16.7)	4 (25.0)	9 (22.5)	14 (22.6)
Management awareness	-	6 (37.5)	6 (15.0)	12 (19.4)
Cost	-	2 (12.5)	5 (12.5)	7 (11.3)
Total firms	6	16	40	62

Tab. 6.29: Most Influential Factor and Environmental Ranking

One might be puzzled by the fact that, the majority of the companies still regard environmental legislation as an obstacle to their competitiveness despite matters of fact supporting the thesis, that environmental initiatives lead to positive market and cost effects. No more than eight companies agree with the statement that environmental legislation encourages a more efficient use of resources, and only 17 firms see it as a way of improving the environmental quality.

Effect	Number of firms	% of firms
Reduced competitiveness	41	62.1
Improved environmental quality	17	25.8
More efficient use of resources	8	12.1
Total	66	100.0

Tab. 6.30: Main Effect of Environmental Legislation

On this general background it is interesting though, that the very majority of compliance plus/excellence firms think that environmental legislation is leading to a reduced competiviveness, whereas this opinion is shared by the minority of compliance firms only.

Effect	Compliance	Compliance+	Excellence	All firms
Reduced competitiveness	2 (22.2)	13 (76.5)	26 (65.0)	41 (62.1)
Improved environmental quality	4 (44.4)	3 (17.6)	10 (25.0)	17 (25.8)
Improved productivity	3 (33.3)	1 (5.9)	4 (10.0)	8 (12.1)
Total firms	9	17	40	66

Tab. 6.31: Main Effect of Environmental Legislation and Environmental Performance

When analysing the degree of agreement with the opinion „people worry too much about whether economic development damages the environment“, it seems that about 2/3 of the interviewees have no special environmental values (full and partial agreement = 70,8%). This is true for the compliance firms and surprisingly even for the excellence companies, but not for the compliance plus firms which are nearly fairly divided between pro-environmentalists and anti-environmentalists (see table 6.32).

Degree of agreement	Number of firms	% of firms	
Full agreement	5	6.9	anti-environment
Partial agreement	46	63.9	
Partial disagreement	14	19.4	pro-environment
Full disagreement	7	9.8	
Total	72	100	

Tab. 6.32: Degree of Agreement with the Statement „People Worry too Much about whether Economic Development Damages the Environment“

Attitude	Compliance	Compliance+	Excellence	All firms
Pro-environment	2 (25.0)	8 (44.4)	11 (23.9)	21 (29.2)
Anti-environment	6 (75.0)	10 (55.6)	35 (76.1)	51 (70.8)
Total firms	8	18	46	72

Tab. 6.33: Degree of Agreement with the Statement „People Worry too Much about whether Economic Development Damages the Environment“ and Environmental Performance

There is some evidence, that companies' employees are well within the boundaries of the mainstream about environmental issues. A comprehensive discussion of the results from our environmental attitudes–questions can be found in section 6.8.3.4 However, the impact on a company's policy may be diminished by rationales neutralising environmental motivations. To be more specific, a large proportion of the interviewees state the opinion that the market will not pay premiums for environmental qualities of products. This underlines the necessary link to a firms strategy for environmental attitudes to have an effect on corporate behaviour.

So, to what extend do the firms of our sample pursue environmental goals? And in what market strategy setting? As our respondents are German SME's, it is not altogether surprising that cost-leadership strategies play a negligible role: our interviewees supposedly face high labour cost (compared to competitors in other countries) and lack production volume. What remains are differentiation and focussed strategies, which seem to be equally attractive to our interview firms – the respondents of all environmental performance groups distribute themselves remarkably even across these two categories. It can thus be said, that there appears to be no connection at all between market strategy and environmental performance. So, what distinguishes companies with a focussed strategy from those following a differentiation strategy?

Groups	Cost Leadership	Differentiation	Focussed	Total
Compliance	0	3	3	6
Compliance +	0	5	6	11
Excellence	1	6	6	13
TOT	1	14	15	30

Tab. 6.34: Market Strategies and Environmental Performance

As for focussed strategies, many companies were found to supply a very narrow product range, such as “finishings for (coat) linings”. In one case there are 3 German firms supplying the domestic market - 2 small and one medium sized company (two of those were by chance incorporated in our sample) – along with two Italian companies. These 5 companies share the same niche in a close oligopoly and are well aware of each other. They can not, strictly speaking, all have a focussed strategy, because this would incorporate market-leadership in a small market, which is neither true regionally (2 Italian companies present) nor necessarily in terms of market share – company A from our example reports a focussed strategy and 67 employees, company B, supplying the same range of products, a cost-leadership strategy and 310 employees. So, we do rarely face companies with a focussed strategy in a textbook sense. What we face are companies with a limited product range fighting over a would-be niche with a small number of competitors.

The firms with a differentiation strategy are often into more common products such as printing and dying (50% of all companies follow a differentiation strategy, but 62% of dying&bleaching-companies), and cling to their customers by customer-oriented services such as speed of delivery and (overall) service – and, of course, product quality.

Factor of Competitiveness	No. of quotes – diff. strategy	No. of quotes – foc. strategy
Quality	14	10
Speed of delivery	5	2
Service	6	5

Tab. 6.35: Market strategies and factors of competitiveness (advantages)

Market strategies being largely unrelated to environmental performance, at least environmental strategy should have a connection to environmental performance. And, indeed, it has. Excellent companies are much less driven by regulations, and many of them surpass “petty looking for scraps”, conventional identification of productivity reserves in production procedures. Only excellent companies say that they (try to) convince potential customers by their environmental performance. Of the excellent companies, almost one half (46%) reportedly follow this approach. This may allow the conclusion that the environmental performance strategy is well understood and distinguished by our interviewees. It seems, however, that there is no such close agreement about the term “eco-products”. There is no significant bias of the eco-product strategy by environmental performance; it bears however some irony that those who should be most able to supply eco-products may be most unwilling to claim doing so. Anyway, the small number of cases in this answer category does not allow to prove anything.

Groups	Reg	Eco Efficiency	Eco Perf	Eco Product	Eco Market	Not relevant	Total
Compl	2 (33%)	2 (33%)	0	1 (17%)	0	1 (17%)	6
Compl+	6 (55%)	3 (27%)	0	2 (18%)	0	0	11
Excell	1 (8 %)	5 (39%)	6 (46%)	1 (8%)	0	0	13
TOT	9 (30%)	10 (33%)	6 (20%)	4 (13%)	0	1 (3%)	30

Tab. 6.36: Environmental Strategy and Environmental Performance

There is obviously a different driver for most of the strategic approaches; compliance with regulations being regulatory pressure, costs for an eco-efficiency approach and the market for the remaining 3 categories. The interviewees were also asked explicitly to state

their firms' reason to adopt environmental initiatives. The results, in our opinion, support the notion that environmental performance has a lot more to do with products than with cradled environmental beliefs. We already pointed out that the compliance firms have rather little in common with compliance-plus and excellence firms, as they are dominated by finishers of technical textiles on one hand and small scale or promotional T-Shirt-printers, while the latter largely belong to the clothes chain.

Our point is that the compliance firms are pretty close to the excellence firms – they share to a remarkable extend the excellence firms' notion of doing more than they have to, which they attribute to their own environmental beliefs (50% give env. beliefs as the reason for adoption, compared to 42% of the excellence firms but only 18% of the compliance-plus firms). This is despite our evaluation of them showing little measurable effort to the benefit of the environment. On the other hand, the compliance-plus firms feel a lot of outside pressure (73% stated drivers from outside to be the reason of adoption). They supply largely the same goods as the excellent firms, but have no systematic approach to environmental issues, which is actually what an EMS is good for. The implementation of an EMS again is the single most distinguishing factor between compliance-plus and excellence firms, as we derived from figure 6.5.

To put it all together: The compliance firms show poor performance but face little pressure because they belong to a different field of business. The other firms divide over the question of whether they have implemented a unifying and problem structuring concept covering environmental issues – also known as an EMS. If they don't have one, they are driven by legislators and customers to perform adequate to the clothes chains and society's standards, while the other firms - because of their unifying and structuring concept called EMS – act before pressure builds up – and feel consequently less pursued.

	Compliance	**Compliance +**	**Excellence**
Adopted because of legislation	2 (33%)	5 (46%)	5 (42%)
adopted because of environmental beliefs	3 (50%)	2 (18%)	5 (42%)
adopted because of market reasons	1 (17%)	3 (27%)	2 (16%)
adopted because of other reasons	0	1 (9%)	0

Tab. 6.37: What is your company's reason to adopt environmental initiatives?

These differences of perspective show in the reception of environmental legislation. The compliance-plus firms show the worst opinion on the subject, while the compliance firms are still in a benevolent nirvana and excellent firms again manage to see some good in legislation – though not without doubt, as the substantial number of 'reduced competitiveness'-quotes show.

	Compliance	**Compliance+**	**Excellence**
Increased efficiency of production	3	1	2
Improved good of society	3	1	6
reduced competitiveness	0	9	4

Tab. 6.38: What is in your opinion the impact of German and European legislation for the environment?

6.4 Skills, R&D and environmental performance

No important differences in skills between the environmental performance groups are to be reported.

		Degree	Technical National Certificate	Meister	Appren-ticeship	On the Job	Employ-ees (sum)
number of Employees	compliance	2.3	2.3	3.8	18.8	30.8	58
	compliance+	4.9	1.6	7.2	46.7	49.5	110
	excellence	5.5	4.5	5.8	44.6	57.9	115.4
percentages	compliance	3.8	3.8	6.6	32.5	53.3	
	compliance+	4.5	1.5	6.5	42.5	45	
	excellence	4.7	3.9	5.0	38.6	50.7	

Tab. 6.39: Qualifications in the FTF-sample

Upon examination of the R&D capacities and their relationship with the factor „size“, one can detect that a large number of smaller firms also have full-time R&D staff of 1 or 2 people; in particular companies with more than 100 employees, however, have R&D departments in which 3 or more people are employed. In total, the sample consists of 25 firms without R&D capacities and 48 with at least some capacity. Fourteen of these only rely on part-time staff for these purposes, 27 solely employ full-time staff, and 7 have both part-time and full-time staff. Anyway it remains remarkable, that in this highly technical sector, nearly one third of the companies do not have any R&D position. The ability of these firms to implement technical changes or production innovations must, even if advisors are consulted, be very limited.

No. of people	0	1-2	3-5	6-10	11-20	21 plus	Total
Full time	39	20	9	2	2	1	73
Part time	52	15	3	3	-	-	73

Tab. 6.40: R&D Capacities

In the FTF-sample it is very obvious: Excellent companies spend significantly more on R&D. They also more often report an impact on env. performance attributable to these activities.

Compliance Groups	Average % employed in R&D	Range	% of firms, who think there is an env Impact of R&D
Compliance	0	-	-
Compliance +	1,98	0,3 – 4,3	55
Excellence	5,0	0,3 – 16,7	85
TOT	3,95		Av. 56%

Tab. 6.41: Nature of R&D Function, by Environmental Performance Group (Face to Face Data)

6.5 Corporate Culture and Environmental Performance

Usually, economic success is a result of economic action. These actions are based on decisions and decisions depend on values, opinions and external driving forces. Motivations may arise from personal experiences and opinions, values of society, institutionalised advice and, inside the firm, from young professionals.

Concerning personal values the interviewees have quite similar environmental values compared to the results of a representative survey by the Umweltbundesamt (Federal Environmental Protection Agency). In this survey pro-environmental opinions with respect to limits of growth and to an estimation of the importance of the ecologic problem are identified.

Questionnaire-Statement: Economic development cannot be supported by the natural resources available.		
	Full Agreement (%)	Full and partial Agreement (%)
compliance	75	100
Compliance plus	55	81
Excellence	60	90
TOT	62	89
BMU-Statement: Are there limits of growth that our industrialised society already crossed or will reach soon ? (BMU/UBA 2000 p.22)		
	Full and almost full agreement	Full, almost full and partial agreement
TOT	59	90

Tab. 6.42: Environmental values in firms and in society

Questionnaire-Statement: People worry too much about the fact that economic development damages the environment.		
	Fully Disagreement (%)	Fully and Partially Disagreement (%)
compliance	50	75
Compliance plus	36	47
excellence	60	80
TOT	48	65
BMU-Statement: In my opinion, the environmental problem is widely exaggerated by many environmentalists. (BMU/UBA 2000 p.22)		
	Full and almost full disagreement	Full, almost full and partial disagreement
TOT	52	82

Tab. 6.43: Environmental values in firms and in society

Our conclusion is, that the environmental values of the textile finishing companies´ representatives do not very much differ between the performs groups and that environmental values within companies do not very much differ to the values of the society as a whole.

Environmental values are therefore not an important driver for environmental action of textile finishing companies in Germany. Economic forces seem to be much more important.

An other cultural difference could be employee orientation of the firms. Only slight tendencies could found. Comparing compliance+ and excellence firms, the former seem (conservatively) to foster employees conscientiousness while the latter are always striving for the best technical solution. But no difference in the value which is given to active employees (modern) can be seen.

	Employees conscientiousness	**always striving for the best technical solution**	**that responsibilities are actively taken over by employees on all levels**	**TOT**
compliance	1	2	2	5
compliance +	6	0	5	11
excellence	2	5	5	12
TOT	9	7	12	28

Tab. 6.44: Principles for Economic Success

Comparing compliance+ and excellence firms, the 4 of the former insist (conservative) on employees attention while at least 2 of the latter see the managements´ responsibility to provide training. But continuous updating of technology is for both groups the best way to achieve environmental protection.

	Cont. updating of technology	**Attention of employees on production**	**Staff training**	**Staff orientation of management**	**TOT**
compliance	5	1	0	0	6
compliance +	6	4	0	1	11
excellence	8	1	2	0	11
TOT	19	6	2	1	28

Tab. 6.45: Environmental protection can best be achieved by ?

Responsibilities for environmental protection are by the compliance+ group mainly seen by the director or owner (conservative). The majority of the excellent firms sees, that everybody may be in some way responsible, which is the more modern position.

	everyone in some way	**employees in specific positions**	**the owner/ director**	**TOT**
compliance	2	1	3	6
Compliance +	3	3	5	11
excellence	9	2	1	12
TOT	14	6	9	29

Tab. 6.46: Who is responsible for environmental protection?

Overall, the opinions regarding the relationship between management and staff seem to be slightly different between the (conservative) compliance+ and the (more modern) excellence group. The compliance group does not really fit into the argument.

6.6 Problems with environmental initiatives

In the opinion of our interviewees, money, or the lack of it, is the most important obstacle to the implementation of environmental initiatives: The two most important problems as well as the 7th and 8th rated problems are related to this issue. Regulations come second with the 3rd and 4th rated problems and information problems with 5th, 6th and 9th rated problems come last. Only one interviewee admitted lacking commitment to be a problem.

The reports on liquidity problems seem rather credible on account of our findings. The complaints about unpredictable regulations can be seen as an understandable reception of today's multiple division of power among European, national and regional public bodies. Yet this is no problem where simple and quick solutions from legislators seem probable.

What seems to be a relatively attractive field of action is the area of informational problems. But in the end it's all trivialities again. Some respondents find it hard to get good advice, so the most feasible move for government might be to create new ways of getting advice into textile finishing firms. But other findings of this study indicate, that uptake of information is the truly limiting factor. A possible way of action for government would be, to help companies improve their management capacity and such build up spare time for the (continual) improvement process.

		the 3 most important problems				
		1.	2.	3.	Sum.	Sum. %
1	It is hard to find the capital for investment	12	4	3	19	63.3
2	Clean technology investments do not show an adequate return (payback period is too long)	7	5		12	40
3	The regulations are too uncertain to plan for new technology	3	4	3	10	33.3
4	Regulation does not support initiatives		2	6	8	26.7
5	Clean technology is still risky and unproven	2	3	2	7	23.3
6	We do not have the right skills and expertise in-house (e.g. R&D)	2	1	2	5	16.7
7	Environmental consultancy services cost too much		3	1	4	13.3
8	Making a profit is more important than env. protection			3	3	10
9	It is hard to get good advice		2		2	6.7
10	Middle management lacks environmental commitment			1	1	3.3
11	Management does not have enough time				0	0
12	Suppliers do not provide any help in adopting environmental initiatives				0	0
13	Others	1	1		2	6.7

Tab. 6.47: Most important problems associated with environmental initiatives (FTF)

Compared to our results from the furniture industry, the textile finishers show more inclination to pay for professional advice. This may have a reason in the fact, that in the case of big process investments, many of the firms employ technical consultants to assist them in planning the new plants. This is necessary, because the small R&D staff is not able to perform these tasks alone.

For Free	9
With payment for the professional services	12
As a return of the association fee paid to professional association	8

Tab. 6.48: Advice should be provided? (FTF)

6.7 The Advisors

The interviews with advisors lead to a picture of innovation, which can be used to explain the role of different advisors.

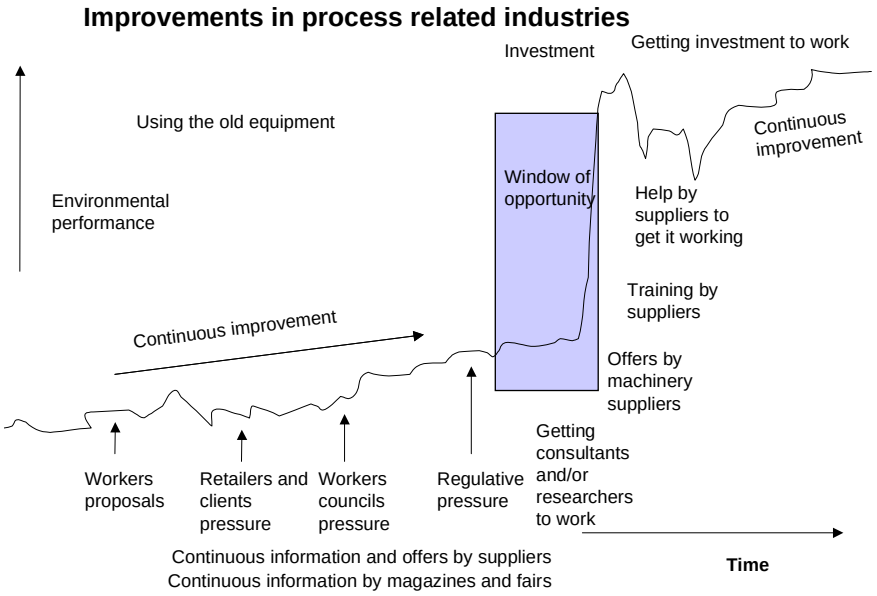


Fig. 6.6: Improvements in process related industries

Continuous information was found to come from suppliers, magazines, associations and can be obtained on fairs. This supports a continuous improvement process, which is additionally stimulated by pressure of clients (and indirectly retailers), workers councils, workers proposals and regulative pressure. But at a certain level, old machinery does not support additional improvements: management has to consider a completely new investment. For the firm as well as for the regulator, a window of opportunity opens, which is approximately 6 month to one year long. This time is given by the suppliers of machinery as the time for the decision making process about a new investment.

Since the existing machinery very probably was quite old (interviewees mentioned machinery up to 40 years old, more than 50% of machinery being over 10 years old (67% in compliance companies, 35% in excellent companies), the technical standard as well as the best available technology will probably have much improved.

The big change to the new technology is often prepared by consultants and/ or researchers. Firms say, that there own capacity would often not be able to manage this without external help. After offers of suppliers have been made and the order has been placed, the supplier of the new machinery will be the most important advisor – sometimes in conjunction with the supplier for necessary chemicals for the new process. They will train the staff and support the test period, which is likely to bring some surprises and throwbacks.

In the firm, technical staff and management will be the most important people to organise the improvement process as well as investments. Workers will be trained occasionally when important changes are due. The stories about the EMS and the environmental report (chapter 5) make clear, that workers participation and influence can be much greater if management culture is taking participation and environmental commitment seriously.

6.8 Digression: Environmental Communication in the Business-to-Business-Sector of the German Textile Chain

In earlier stages of this research-project, communication had been identified as a crucial aspect of SME's behaviour towards ecological issues and their assessment of competitive implications. Namely, SME's limitations assessing long run consequences of technological alternatives had been a topic for intense discussions.

The idea arose to expand our understanding, not only of SME's capability to process incoming data and appropriately react to it, but to take communication as a whole and a set of variables that were seen to be likely influencing it. The ultimate aim being the identification of diffusion-processes of information (and innovations). The following text presents the results of this project. It was carried out as a final university project of Michael Keil for Prof. Ursula Hansen, university of Hannover, chair for marketing. The full study is 95 pages long (including appendices) - and in German ("Business-to-Business-Umweltkommunikation in der textilen Kette für Bekleidung"). This text is supposed to give a comprehensive overview of the results.

6.8.1 Theoretical Background

Following Fichter's (1998; 290) definition of environmental communication, B-to-B-environmental communication was seen as "market-directed communication activities concerning environmental issues and/ or towards the definition or fulfilment of environmental responsibilities by companies to companies. This applies regardless of the other company's position as a customer, supplier or institutional investor."

This broad definition was needed to include sociological categories into our research, that were seen to play a rather important role in our targeted diffusion processes. We specifically included marketing channel theory in our analysis (see for example Stern 1969, Michman 1974, Steffenhagen 1975, Hansen 1990, Frazier/ Antia 1995, Hunt 1995).

Broadly speaking, this branch of marketing theory included a number of sociological issues such as role expectations, power and conflict into their analysis of distribution channels. This line of thinking seemed appropriate to expand on our given object of research, the textile finishers. Role expectations are, broadly speaking, expectations of the social environment that are intended to direct the behaviour of a generic person in a specific social position (e.g. manager, student or father) and is sanctioned with the withdrawal of the benefits of the social system in question (money, respect, intimacy). Following this approach we took the textile finishers and analysed them in the social context of the distribution channel. We further assumed that their relationship towards their customers, the outfitters, would be most interesting, as consumer oriented thinking would be likely to start with the outfitters in whose sphere of influence textiles gain their marketable quality. One might say that we analysed the customer orientation of the textile finishers in a very focussed way.

6.8.2 Methodological Approach

Designing a model is often a very useful step to structure one's own thinking and evade obvious mistakes and neglects. On the other hand, for other people trying to understand a study it is the briefest possible form to present the whole of one's own approach.

Our model (see figure 6.7) contains 7 interconnected variables. The underlying variables (1^{st}) retailers, (2^{nd}) outfitters' and (3^{rd}) intra-industry trades information needs, (4^{th}) atti-

tudes (meaning outfitters' and finishers' attitudes, respectively), (5th) bargaining processes are seen to influence (6th) the finishers' perception of their (professional) situation and ultimately their (7th) communicative activities with respect to environmental issues as defined above, which can be further differentiated in terms of instruments used and contents communicated.

1st: retailers are supposedly the most important stakeholders for the outfitters. As such, their information needs had an impact on outfitters' answers to the question whether stakeholders played an important role in the process of picking up new communication-instruments.

2nd: outfitters' information needs were measured directly in terms of what pieces of information they demanded from suppliers, what instruments were used and if the use of these instruments was explicitly enforced via supply agreements.

3rd: intra-industry trade was expected to play a minor role. Nevertheless, if it were present, it might play a substantial role. So, respondents were asked if they made substantial use of these traders, and if so, whether these traders had influence on the information communicated and the instruments used.

4th: attitudes, in a *very* focussed definition, incorporate underlying interpretations of reality. As a consequence, the outfitters' attitudes supposedly play an important role in their definition of information needs, and the finishers' attitudes should play an important role in their perception of their professional situation. Respondents were asked to express their agreement or disagreement towards each of 13 statements. In order to make it easier to connect this research to the overriding performance & culture – project,

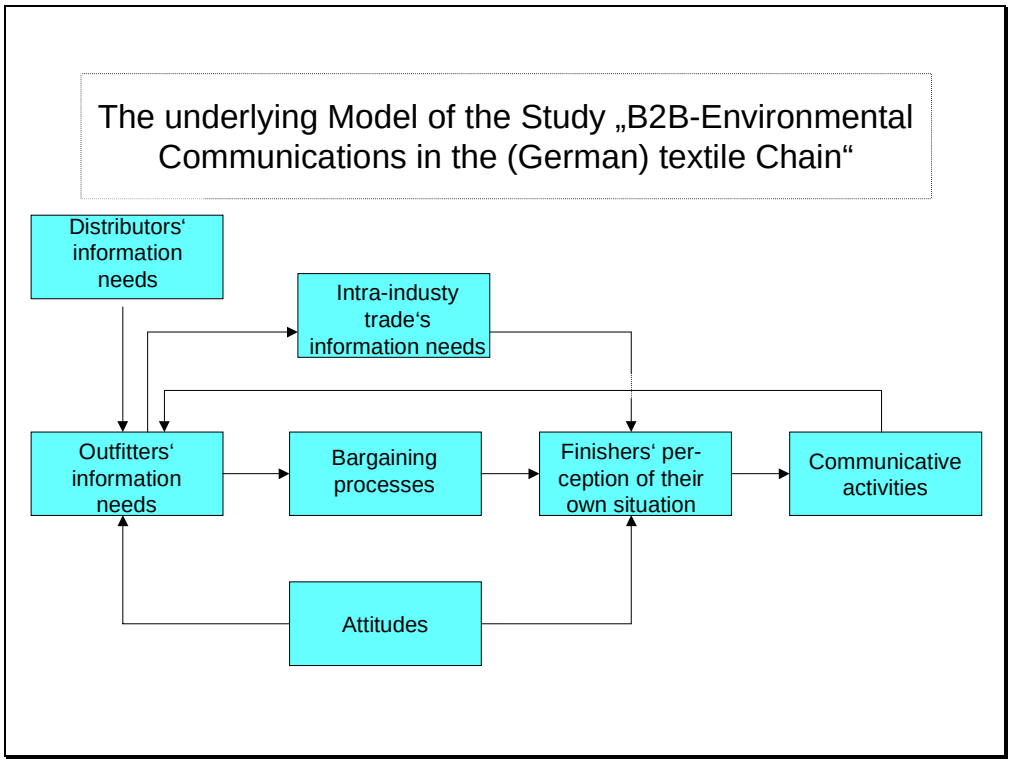


Fig. 6.7: The underlying model

we used the same 4 category Likert-Scale as in the rest of the questionnaire. As for the topics covered, please refer to the appendix or the results-section below.

5th: bargaining processes are a direct way to match the needs of one party with the activities of the other party. They can be co-operative or not, but they usually bring expectations closer to perceptions or vice versa. Power, as the ability to influence the behaviour of others, plays a crucial role in determining whether a given actor can bring reality, and thus perception, to better meet his expectations, or if he has to concede the inappropriateness of his or her expectations and consequently has to change them. Co-operative bargaining was measured in terms of projects between finishers and outfitters to develop communication-instruments and the success of these initiatives. On the other hand, respondents were asked if there had ever been conflict over whether a given piece of information was rightfully a finisher's business secret, or should be given to the outfitter. They were also asked about the outcome of this conflict.

6th: The finishers' perception of their own situation is seen to play an important role, e.g. in determining how difficult it might be to push them towards a more active part in the picking up of environment-friendly practices, how readily they will accept outside pressure or were they will likely put up substantial resistance. However, perception can only be inferred to, and is thus difficult to measure correctly. It is also strongly connected to attitudes, and thus our inferred view of these perceptions is to a large extend derived from our attitude-measurement. One can possibly say that perception of situation is a very narrow and specific part of our respondents attitudes.

7th: communicative activities are on one hand the result of the variables discusses above. On the other hand their perception by outfitters is the basis of feedback processes (especially bargaining processes), that either stabilise the finishers' perception or forces a change. Communicative activities are measured in terms of instruments used and pieces of information communicated.

The field work was designed to minimise additional expenditures and working time. An additional set of question items was inserted into the "Performance & Culture"- long questionnaire, which slightly increased average interview time from about 80 to 90 minutes. This extended questionnaire was used in 27 out of 33 interviews. In addition, a set of telephone-based interviews with 24 outfitters was made. The questionnaire used in these interviews corresponded with the extra-items for the long questionnaire, i.e. they approached the same issues but were refitted with respect to the different perspectives. These interviews usually took 8-10 minutes, a few developed into discussions of 45 minutes. Some important qualitative insights were gained from these discussions.

6.8.3 Important Findings

6.8.3.1 Market Structure

The relationship between finishers and outfitters usually includes no intermediaries. Only 16,7% (n=4) of the outfitters and 18,5% (n=5) claimed to make "substantial" use of intra-industry traders. Of those 9 companies only one perceived the traders to have "strong" influence on pieces of information exchanged and a "medium" influence on the instruments used; all other respondents saw "little" or "very little" influence in both categories.

59.3% of the interviewed German finishers describe themselves as "Lohnveredler" (subcontracting processors). This means that they do not own the textiles they process. An outfitter delivers them, the finisher carries out the negotiated tasks and sends them back to the same outfitter. The planning period is very short (one week) and the orders in hand usually last no longer than 2 weeks into the future.

6.8.3.2 The Extent of Environmental Communication in the German textile industry

For 87.5% (n=21) of the outfitters and 81.4% (n=22) of the finishers environmental aspects of the exchanged goods play a role in negotiations and / or everyday communication. However, for 37.5% (n=9) of the outfitters and 44.4% of the finishers this is only an issue in negotiations. On average, outfitters have little faith in oral communication and say it has little importance (average score 1.38, n=21; 1= no importance, 2= little importance, 3= partially of importance, 4= high importance). Or as one interviewee put it, “We establish an open and co-operative communication style with our suppliers, but only written commitments really count for anything.”

6.8.3.3 Contents and Instruments of Environmental Communication

Outfitters and finishers mostly agree an the relevance of specific instruments. In general product oriented communication accounts for most of the environmental communication taking place, whereas process oriented communication, i.e. communication about the environmental impact of the production process itself, is only an issue with outfitters that put a high emphasis on supplying environment-friendly clothes. 87.5% (n=21) of the outfitters and 70.37% (n=19) of the finishers interviewed use some kind of product-oriented communication instrument, whereas only one finisher communicated his ISO 14001-certificate and another his ISO 9000-certificate[16] (3.7% each). The reason why no such instruments played a significant role proposed by an outfitter was the small size of most finishers, which makes these certificates (relatively) crushingly expensive.

The range of product-oriented instruments covers Eco-tex 100 labels, product data sheets and some delivery specifications (= other written commitments). If they were being used, finishers gave these instruments always high scores for importance.

In terms of the pieces of information exchanged, instruments have a tendency to be uniformly negotiated. This is rather trivial where a third party guarantees a certain standard and either of the negotiating parties refers to this standard. Yet their seems to be a tendency to also attach instruments that would appear to be more appropriate for individualisation within individual finisher/outfitter-relations, i.e. product data sheets. Product data sheets, which would appear like a freestyle-tool easily customised and in this way able to reflect the complexity of myriad specialisations in modern textile finishing – is more often being used in the standardised form of the “DTB-Produktinfo” (product data sheet of the round table of textiles- and clothing-companies).

The following table shows especially well, that also the individual pieces of information exchanged reflect the tendency towards a more product-oriented and less process-oriented perspective. Apart from land of origin, all process-oriented data is collected by a below average number of firms (social conditions of production, cultivation-methods, environment-friendly production). Information on the land of origin is needed for customs procedures and gathered primarily for this reason.

[16] ISO 9000ff, of course, does not directly cover environmental issues, but it was included to control whether management oriented instruments as a whole or only environmentally management-oriented instruments were the issue from the respondents’ point of view.

Compulsory Instruments	n(outfitters)	Av. Score (ou.)	n(finishers)	Av. Score (fin.)
ISO 9000ff certificates	0	1.52	1	1.83
ISO 14001 certificates	0	1.19	1	1.67
Environmental report	0	1.05	0	1.33
Eco-tex (only)	4	2.71	9	3.39
Product data sheets (only)	2	2.57	2	1.96
Other written commitments (only)	4		2	
Eco-tex and product data sheets	9		4	
Eco-tex and written commitments	1		1	
Product data sheets and writen commitments	1		0	
Product d.s./Eco-tex/ written commitments	0		1	
Total (ISO / env. report excluded)	21		19	
Percentage of sample	87,50%		70,37%	
Percentage of companies w/B2B-Communicatior	100,00%		86,36%	

Tab. 6.49: Instruments of environmental communication and their evaluation by respondents[17]

Piece of information exchanged	Outfitters		Finishers	Processing inc. Bleaching		Dying and Printing	
	Cases	% of repondents (N=21)	% of repondents (N=19)	Cases	% of subgroup (N=11)	Cases	% of subgroup (N=13)
Land of Origin	21	100,00%	57,89%	3	27,27%	8	61,54%
Social conditions of production	6	28,57%	0,00%	0	0,00%	0	0,00%
Cultivaton methods (natural fibres)	1	4,76%	15,79%	2	18,18%	1	7,69%
Environment-friendly production (synthetic fibres)	5	23,81%	15,79%	2	18,18%	2	15,38%
Pesticide-residues in fabrics	14	66,67%	21,05%	2	18,18%	4	30,77%
Employed bleaching agents	11	52,38%	52,63%	6	54,55%	8	61,54%
Employed coloring material	20	95,24%	89,47%	9	81,82%	12	92,31%
Type of finishing (without/mechanical/chemical)	13	61,90%	68,42%	9	81,82%	9	69,23%
Employed finishing agents	15	71,43%	52,63%	7	63,64%	7	53,85%
Others	4	19,05%	0,00%	0	0,00%	0	0,00%
Average (excl. Others)		56,08%	41,52%		40,40%		43,59%

Tab. 6.50: Contents of environmental communication

6.8.3.4 Determinants of Environmental Communication

Following our explicative model from section 4.3.1 we try to relate the acquired data to the variables proposed there in order to take a look behind the phenomena. From our point of view, these aspects should provide a rich source of policy implications.

There are a number of facts supporting the point of view, that retailers are not only a very potent actor of the textile chain, but also that most initiatives on environmental communication originate here. First, 59.53 % of all respondents answered that outfitters always or most of the time have the initiative implementing new communication-instruments (see table 6.51).

[17] Please note that the respondents were not asked to state the importance „other written commitments“ because this is a heterogeneous subgroup. The following subgroups are composites of categories; the stated relevancy was used to compute the average scores for single instruments above.

	always outfitters	mostly outfitters	balanced	mostly finishers	always finishers
Outfitters	12	4	2	2	1
Percentages	57,14%	19,05%	9,52%	9,52%	4,76%
Finishers	4	5	7	2	3
Percentages	19,05%	23,81%	33,33%	9,52%	14,29%
Total	16	9	9	4	4
Percentages	38,10%	21,43%	21,43%	9,52%	9,52%

Tab. 6.51: Who had the initiative when new communication instruments were implemented?

Second, most outfitters (n=16, i.e. 2/3, ¾ of those answering to the question) again say that stakeholders played an important role in these implementations, 11 of those referred to distributors; 5 respondents specifically mentioned large mail-order-firms such as OTTO or NECKERMANN (see table 6.52).

	Outfitters	Finishers
Did stakeholders play a substantial role for the implementation of these initiatives?		
Yes	16	4
No	5	17
If so, which stakeholders?		
Retailers	11	
Consumers	3	
Regulators/ Politics	2	2
Industry associations		2

Tab. 6.52: Stakeholders' influence on environmental communication

As a consequence, government activities can gain a lot of impact if they use distributors as a "transmission-entity". This could happen, for example, via a co-operative re-definition of distributors' supply-specifications.

A relationship between outfitters' opinions on environmental issues and the degree of environmental communication, measured in numbers of pieces of information exchanged, could not be proven. There was some evidence supporting this hypothesis, but it was statistically not relevant enough.

Statistically relevant, though, was a positive relationship between the importance respondents gave to process-oriented instruments (ISO etc.) and their agreement with "Increased duties to give information on conditions of production and substances employed are just another blow for our competitiveness." We believe this to be an indication of increased awareness of the (high) costs of information after a company came in contact with ISO.

As stated earlier, the initiative usually lies with the outfitters, with a good probability of being often the result of retailers' initiatives. Co-operative bargaining processes are most of the time employed by large companies. There is some indication that finishers who took part in these co-operative processes deliver on average more information than others.

The level of conflict is perceived very differently by outfitters and finishers. While 45.8 % of the outfitters state that there were arguments with finishers over whether a given piece of information should be exchanged or remain a secret of the supplier, only 14.8 % of the finishers concede this. This could be a result of differences between the groups "German

outfitters' suppliers" and "German finishers", i.e. foreign finishers could possibly account for these differences. Another theory might be that troublesome finishers often lost their customers and are over-proportionally often no longer present. Finally, the finishers might have been unwilling to respond accurately, because they wanted to present themselves as open and responsible companies (and individuals).

1. Attitudes about overriding environmental issues

Both groups agree on the issue of natural resources not being able to sustain economic growth forever; 74.1% of the finishers and 57.9% of the outfitters "absolutely agree" with this statement. Nonetheless, there is a high level of dissent over whether the general public worries too much about the economy's influence on the environment; 37% (33.3%) of the finishers (outfitters) clearly disagree with this statement, 14.8% (20.8%) clearly agreeing with it, the rest taking positions in between. The respondents made it clear that they disliked to choose between employment and protecting the environment being more important. Especially the finishers tended to take position in the neutral categories (70.3%), whereas 40.9% of the outfitters (often grudgingly) clearly disagreed with this statement. However, another 40.9% of the outfitters "partially agreed" with it as well.

The groups clearly differentiated again in their agreement with the statement "Higher taxes for high-pollution-industries are justified." 50% of the outfitters "agreed with this statement (another 18.2% partially), whereas only 22.2% of the finishers did so (another 25.9% agreed partially). This might reflect the finishers greater sensitivity to those taxes, as they, in general, use more natural resources (especially water and energy) than outfitters. In general, respondents did not seem less environment-oriented than the rest of society – with some special issues.

2. Evaluation of the textile industry's environmental impact

Most textile finishers and outfitters see the environmental performance of their own industry even more critical than the economy as a whole. 69% of the outfitters (44.4% of the finishers) clearly disagree with the statement "The general public worries too much about the environmental influence of the textile industry." In addition, 44.4% of the finishers (and 56.5% of the outfitters) agree at least partially that "The general public under-estimates the danger of clothes to the health of consumers." The answers correlate negatively and significantly[18]. On the other hand, the respondents agreed on environmental information being easily accessible to finishers (74.1% of the finishers and 58.2% of the outfitters agreed at least partially), but most respondents (69.3% of the finishers and 82.6% of the outfitters) believe, that the health of consumers is not always taken enough into consideration when decisions concerning substances to be used in production are made.

3. Evaluation of green clothes' market potential

Outfitters and finishers agree on being sceptical about green clothes' market potential. Around 60% of both groups do not think (at least partially) that green clothes can be profitably sold outside niche-markets. Both groups agree as well on the reason why: customers don't really want them – at least not enough to pay more. More than 60% of both groups agree that "Consumers have to buy accordingly if they want green clothes."

4. Perceptions of responsibilities

[18] Pearsons Co-efficient –0.441, 3.5% margin of error for the outfitters, -0.427 and 2.6% respectively for the finishers.

70.3% of the finishers and 50% of the outfitters disagree at least partially with the statement “The most serious environmental sins are committed outside of the finishers influence.” 81.5% of the finishers and 83% of the outfitters agree that “Finishers have a great influence on the environmental quality of textiles.” 65.4% of the finishers agree at least partially that “Guaranteed ecologically feasible raw materials are easily available.” On the other hand, finishers did not show too much sensitivity to differentiate between the legally possible and the healthy or environmentally feasible. 59.3% of the finishers absolutely agreed with the statement “Substances that are not forbidden can certainly be used in production.” Only 11.1% clearly disagreed with this. The outfitters think obviously different about this issue. 50% of them clearly disagree with the statement, 33.3% absolutely agree.

5. *Evaluation of increased responsibilities to give product information to the general public*

Most respondents expressed high regards for increased responsibilities to give product information to the general public – as long as foreign competitors were subject to the same obligation. 78.3% of the outfitters and 66.7% of the finishers agreed that such responsibilities would be principally “desirable”. 66.7% of the outfitters and 55.6% of the finishers think that this kind of responsibilities would be good for the environment. 71.4% of the outfitters and 63% of the finishers do not think this would be bad for competitiveness.

Most finishers (81.4%) say that the environmental performance of their products is an issue with customers. The value their own share of initiatives higher than the outfitters, they put smaller emphasis on the role of stakeholders in general, and are unaware of the role of distributors for the definition of new communication demands they are faced with.

Most of them believe to have a great influence on the environmental quality of textiles, do not put the blame for environmental sins on other groups and find environmentally feasible raw materials relatively easily available. They think it’s rather easy to acquire environmental data from suppliers and see the threat of textiles to health and the environment only gradually less severe than the outfitters, just like the relevance of decisions that do not evaluate properly the possible impact on consumers’ health. They are not substantially more critical about responsibilities to give information to the general public. However, 50% of them insist on using substances that are not forbidden, with no concern about their influence on consumers’ health or the environment.

6.8.4 Conclusions

From this research we draw the conclusion that textile finishers are not much used to play an active role, implementing new management tools or seizing business opportunities. Instead, they apparently define themselves as able technicians and masters of their domain in the production chain, who let the customers define what’s the right kind of product. Some of the outfitters again have developed well known brands and a very active approach, often also with respect to the environment. Yet the SME’s of the outfitters pretty much share the business style of the finishers. Their approach on environmental issues is often a result of their customers’ approach. As one respondent put it: “We’re not much into environmental issues because we don’t supply to big companies like OTTO or NECKERMANN.”

So, a very efficient way of influencing the textile chain might be the development of environmental standards with the mentioned big companies. When those standards are im-

posed on suppliers, there might be a good chance that they won't run different production lines, thus supplying goods according to the higher standard to all customers.

6.9 The hypothesises as part of a system

It may be of use to see the hypothesises as part of an interrelated system of variables. Within the system given in the figure 6.8 it is shown by the research, that legislation and market are really an important influence on the environmental initiatives of the textile finishing sector. Direct influence of the public opinion could not be found, since no relevant opposition or help by stakeholders was experienced by any firm in the face to face interviews. This is surprising, since until recently textile finishing was known as a strong water polluter. There are a lot of stories about rivers in red and green according to the production program of dye factories. Advancements of technology and rigid control by government has obviously resulted in a sector, which is no longer of special interest to local environmentalists.

The role of the advisors seems like a helping role rather than a driving role. Limits to the activities of the advisors are set by the ability of the firms to take up and process advice. A special importance of advice concerns process investment, which could not be handled by the firms R&D staff alone.

Within the firm, it can be shown that strategy and values (concerning the relationship between management and staff) of the management interrelate with environmental initiatives.

Surprisingly, environmental values seem to have no influence on environmental performance.

Average employees qualifications do not seem to have a relevant influence. But a strong R&D department and its technical know-how seem to be a necessary input for excellent environmental performance.

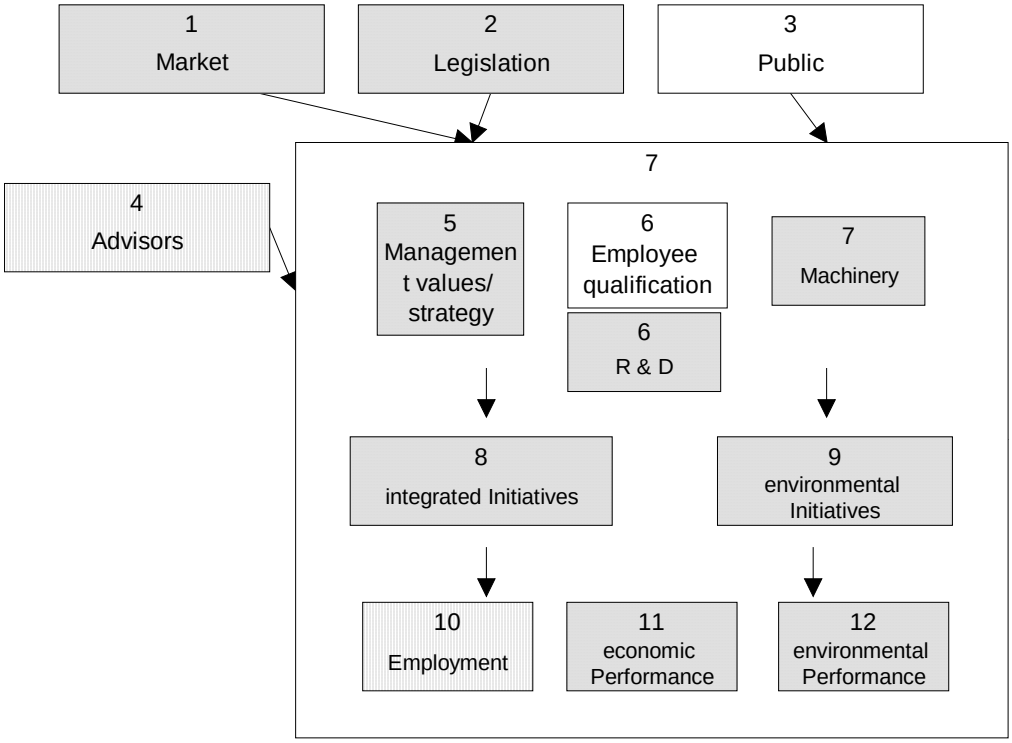


Fig. 6.8: A model of the company (important variables dark)

Concerning many environmental aspects, mainly integrated initiatives could be found, which have a good business sense beyond regulation or safety & health. But in air protection and water protection, some end-of-the-pipe technologies are still necessary, which are costly environmental initiatives.

It can only be shown with the results of the postal questionnaire, that initiatives with an expected environmental outcome have in some cases also a positive impact on employment (positive here – in opposition to the stock exchange discussion - meaning more employment). The face to face interviews do not show a work creating effect of environmental initiatives.

Most economic indicators rise – at least in some cases - by carrying out environmental initiatives. It could therefore be shown, that environmental initiatives in the textile finishing sector make it possible to overcome the burden of higher cost by better productivity, sometimes higher price and higher sales, better competitiveness and position in the market and finally better profits.

The variables 3 (public) and 6 (employee qualification) seem to be less important for the continuous environmental improvement.

In principle, the variables are interconnected as shown in the figure and - in good firms - lead to the double dividend of profit and environmental performance.

6.10 Environmental Initiatives

There is a lot of information in the answered questionnaires concerning details of initiatives. Stories are very much focussing on aspects, which either need high investments (waste protection and saving, energy saving, air protection) or do affect the processes (toxic use reduction). But the single two stories told about EMS and the environmental report highlight the special impact, these initiatives can have.

Waste management as well as packaging were not subject of one single story. These initiatives seem to be comparatively unimportant for the companies.

6.10.1 Environmental Management Systems

5 companies have certified environmental management systems, 3 according to EMAS and 2 according to ISO 14 001. 5 more companies have planned to implement an EMS in the next two years. The driver was seen mainly in the market (40%).

The environmental initiatives practiced by all 5 firms before the implementation are the highly regulated ones (air and water protection, hazardous substances). The EMS seems to foster activity in the cost and market related environmental initiatives.

	before	after
Waste	4	5
Energy	4	5
air protection	**5**	**5**
Water	3	5
waste water	**5**	**5**
Transport	2	5
Noise	4	5
Hazardous materials	**5**	**5**
Processes	4	5
Co-operation	1	4
Labels	2	3
Packaging	1	3

Tab. 6.53: Initiatives before and after implementation of an EMS (FTF)

The implementation of an EMS has obviously the function of filling gaps

Some of the elements of an EMS are also implemented by nearly all firms. A responsible person has to be appointed in most cases by law, a supplier strategy is necessary to follow elementary ecological market demands as well as mandatory changes such as forbidden substances.

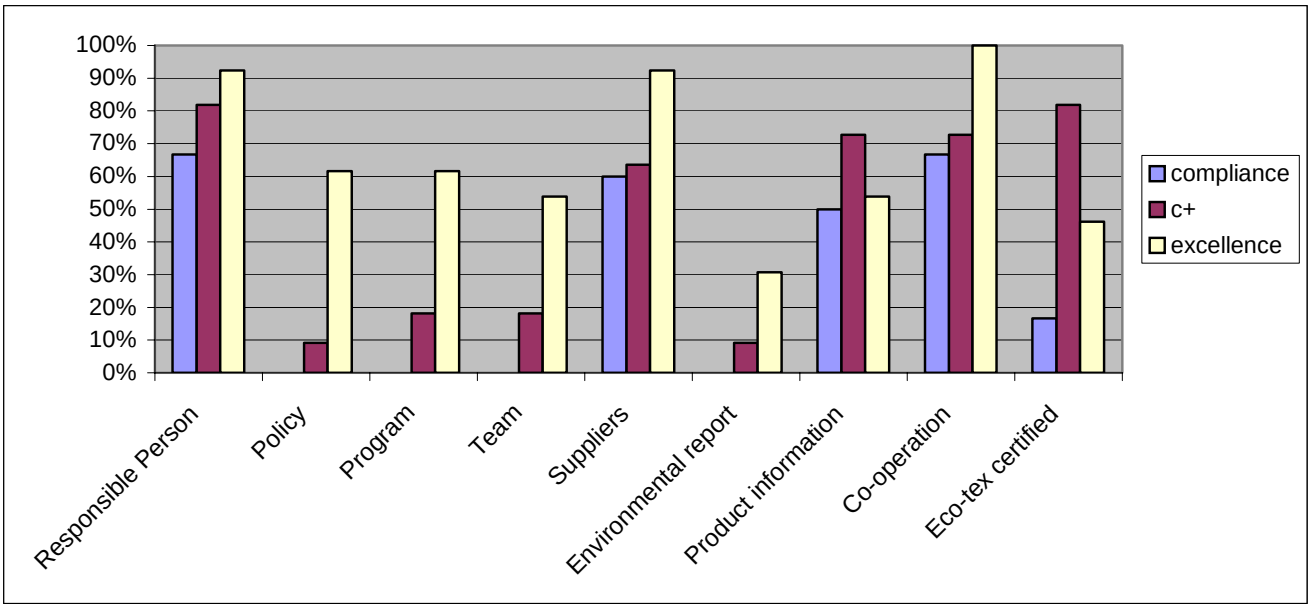


Fig. 6.9: Elements of an EMS in the performance groups

Concerning the usage of financial grants for environmental protection (e.g. investment aid) excellence firms perform better. They know more about possibilities and are at least able to use them. Overall, only 13 out of 30 firms have access to incentives, but 4 out of 5 firms with an EMS in place make use of them.

Question: Up to now has your company been able to adopt and profit from incentives offered to reduce the environmental impact?							
	EMS in place	not at all		a little		moderately	
compliance	No	5	5	0	0	0	0
	yes	**0**		**0**		**0**	
compliance	No	5	5	3	3	2	2
	yes	**0**		**0**		**0**	
excellence	No	3	4	0	2	4	6
	yes	**1**		**2**		**2**	
TOT		14		5		8	

Tab. 6.54: Use of incentives and ecologic performance group

Environmental Management (605): Due to the owner, environmental management is the only important initiative ever undertaken, which is of relevance for the success of the firm. Other initiatives which have been undertaken since 1994 are mainly the outcome of discussions in the ecologic working group (within the EMS), which meets several times a year, and the environmental manager. External help is only seldom employed.

6.10.2 Environmental communication and co-operation

Environmental communication and co-operation is widely used in the textile chain. Surprisingly, most of the C and C+ firms and all of the excellence firms are following some co-operative approach in the product line to optimise products.

Also surprisingly, the Öko-Tex 100 standard is more used by c+ firms than by excellent firms. There is some evidence, that some excellent firms seem to be “beyond Öko-Tex 100”, which is considered to be a basic requirement and not sufficient on the long run.

Instrument	compliance (%)	compliance + (%)	excellence (%)
Environmental product information	50	72,7	53,8
Environmental report/statement	0	9,1	30,8
Öko-Tex 100 certification	16,7	81,8	46,2
Co-operational approaches	66,7	72,7	100

Tab. 6.55: Instruments of environmental communication and co-operation (FTF)

Co-operational approaches are to assist clients in their projects (17 cases), to initiate co-operative development projects with suppliers (19 cases) and to inform customers about ecological aspects of products (17 cases).

Environmental report (633): The most important environmental milestone was the preparation of their first environmental report in 1995, which was done (apart from cost decreases) in order to change corporate culture and gain in competitiveness. The first two years after this took place, the improvements of performance did not meet up to the expectations, but “all of a sudden”, after two years time, a lot of opportunities were discovered and exploited. The initiative is now widely regarded as a huge success.

6.10.3 Air protection

11 companies mentioned initiatives to protect the air. They use different technologies, which are all end-of-pipe technologies.

Machinery	Average investment Cost (€)	Cases	Profitability
Filter	46.250	5	(2) cost down, (1) cost up
airwasher	135.000	3	(2) cost down, (1) cost up
adsorption	50.000	1	No change
afterburner	250.000	1	No change
Other	96.250	5	(1) cost up

Tab. 6.56: Air protection initiatives (FTF)

Initiatives are often driven by health&safety aspects (5) and regulation (4). Companies report, that the initiatives drive cost up (4). The initiatives lower the risk of noncompliance (4 down) and such support image (3 up), but they are a burden on profitability (2 down).

Solvent reduction (609): A vapour-incinerator was installed in 1988 at costs of 250,000 Euro and reduced emissions by 95-99% while the running costs remained approximately the same. The issue was identified by a consultant who also was a big help later on at “reasonable” fees. Internally, the general management picked up the idea and, with limited help from workers, solved the issue. TR would have tried to implement the technology on their own, but Mr D doubts that they would have succeeded in that case. The only problem with the vapour incinerator is its limited capacity.

Solvent emissions (611): Due to government regulations SE implemented charcoal filters in 1999. The initiative was picked up by the technical manager, who executed it with the help of the foremen and the supplier of machinery, KLL, Bremen-Stuhr, whose service was of good quality and cost 75,000 Euro. Local authorities ‘meant well’, but their help was, as in the case of the water treatment plant, limited because of frequently changing personnel in charge – which always changed priorities and limitations for the process. Another problem were neighbours, who moved into the area when the factory was already in operation, yet who now complain about the noise of the filter and, most originally, about emissions (which they did not do before, because the emissions rose from the multiple sources straight into the air, while now there is a visible ‘pipe’ at ground level). SE could not have implemented the initiative without external help, and they would not have tried.

Noise and air protection (627): There is some pressure from (unorganised) neighbours to reduce noise, which led directly to the implementation of an air intake muffler worth 75,000 Euro in 1998. In addition, it had some influence on the implementation of a circulation dryer worth 250,000 Euro (Supplier: MDM, Neustadt/Weinstraße), which now performs satisfactory, after having exploded because of a construction error. Additional external help came from local emissions control authorities, for example with measurements and calibration. The initiative would have been impossible to carry out without external help.

Substitution of solvent (606): Mr. W was troubled by the question about environmental initiatives and milestones. The only positive action he remembered was the substitution of benzine by rape-oil, which was in favour of the workers because of better working conditions. This took place in 1990, when workers complained and indicated the chance for action. Some help was provided by a local consultant (TUBIS/ Nordhorn), but they could have carried out the task on their own as well. No machinery or extra qualification was necessary. The process started with some problems and extra waste, but this phase was overcome.

6.10.4 Waste management

All of the firms interviewed separate waste.

Type of waste	Separate	Recycle	Total
Household type waste	25	2	27
Paper and cardboard	2	25	27
PE-film	3	22	25
Steel waste	1	22	23
Waste textiles for recycling	8	15	23
wood	3	10	13
Waste chemicals	12	0	12
Filter cake	11	0	11
Oily material	11	0	11
other	3	1	4

Tab. 6.57: Types of waste disposed of separately or recycled (FTF)

The main reasons for waste management are cost (18) and regulation (8) (see table 6.24). The economic impact seems to be very low, since no impact on one of our measures for economic impact was mentioned by more than one firm. This contradicts that firms most often mention cost reasons for waste management or at least means, that cost savings are comparatively low.

There seem to be possibilities for improvements in waste management. Only two thirds recycle waste textiles, which are otherwise sometimes reported to be a valuable secondary raw material. In three cases each, PE-film and waste wood and in two cases paper/cardboard are not recycled.

6.10.5 Energy

Companies report, that the initiatives reduce cost (12) with influence on prices (4), foster sales (3), position in the market (3) and competitiveness (5). A positive influence on profit is reported by 7 companies. This is the highest number of companies mentioning a positive influence on profit of all initiatives.

Initiative		Investment		relative savings
		Cost	Date	
Energy efficient heating system	3	7.000-3.000.000 €	Late 90`s	1 medium, 2 high
Efficient heat management	5	250.000-5.000.000 €	90`s	2 low, 3 medium
Integrated heat and water management	23	2.500-750.000 €	90`s and earlier	3 low, 5 medium, 13 high
Energy efficient lighting	6	2.500-6.000 €	90`s	2 low,1 medium, 1 high
other	2	5.000- 75.000 €	Late 90`s	2 high

Tab. 6.58: Energy efficiency initiatives (FTF)

Energy saving (613): In 1998 initiated the acquisition of an improved steam boiler. They worked out specifications along with some workers and contacted suppliers of machinery. Finally, the suppliers WEISSHAUPT and JUMY delivered the new device for 600,000 Euro. Their service delivery was good, and though the price was pretty high and there were some problems with the available space, the initiative was a full success and a payback period of 2 years was achieved. Before that, in 1991, a concept for using waste heat was introduced. Again, general management come up with this initiative. This time, they only contacted some wholesalers and implemented the new technology themselves at costs of 2,500 Euro with good success.

Energy saving (625): Very successful as well was the implementation of a direct heating for their tenters, despite costs of 1.5M Euro. This was an upgrade to state of the art equipment and therefore an uncomplicated project (no external help was needed), with a payback period of 2 years (!), which means, that overall costs dropped some 7-10% as a consequence of this investment. The supplier of machinery was BRÜCKNER, Ehrbach.

Energy saving (628): Concepts to reuse waste heat were implemented in the boiler house and bleaching plant in 1996 (60,000 Euro, medium savings; boiler 20kW, bleaching 60 kW) and the air-intake-exhaust-system (75,000 Euro, high savings: 240 kW). The latter initiative also decreased noise emissions substantially, thus improving the relations with neighbours.

The initiative was implemented by general and technical management, who supervised the on-site construction. The supplied machinery (supplier: SCHEUCH, Ingelheim) was, however, oversized; it emitted 70dB of noise, which is far too much for a mixed residential/industrial area. The problem was overcome by use of a frequency converter. Estimated payback period is 7 years.

6.10.6 Packaging

Packaging is no real important environmental aspect in textile finishing. After all, the companies still follow historic methods of packaging. Textile often is normally rolled and wrapped in polyethylene film (formerly it was wrapped in paper). Some optimisation took place concerning the thickness of the film and some projects were mentioned to introduce multi way rolls.

Cardboard rolls used several times	6
Cardboard rolls one way	6
Polyethylene film	26
paper	2
other	9

Tab. 6.59: Methods of packaging used by firms (FTF)

No real “initiatives of change” could be identified.

6.10.7 Avoiding toxic substances

It is widespread in textile finishing to avoid questionable substances (e.g. Azo-Colours, heavy metal colours etc.). Two thirds of the firms try to reduce the used amount of questionable substances or to phase them out completely. Often, a whole process has to be changed.

A couple of finishing processes is completely questionable. These could be processes applying weight to silk by heavy metals to make it heavy or processes which try to make artificial fibre similar to natural fibres, which are preferred by customers. Most of the people know about the “bad intention” of these processes to fool customers. Some of them apply them due to the will of the client, but some of them also try to avoid them.

Substitution of single substances	23
Substitution of questionable processes	21
Use-reduction of single substances	20
Avoiding unnecessary finishing	15
Other	2

Tab. 6.60: Methods of toxic use reduction (FTF)

Only a few companies are in search for close-to-nature-chemical alternatives in finishing. Plant colours are applied by 2 firms, mineral colours by one firm and three firms follow an “other” approach.

Certification according to the guidelines of the International Association for Natural Textiles (601): From 1996 onwards the company is certified according to the Eco Tex 100 standard due to corresponding demand by its customers. In the late 1990s the International Association for Natural Textiles was founded with the main goal being the creation of a better standard than the Eco 100 Standard. Being pushed by the new director the management of S. decided to join the new association in order to take an active part in the discussion about the new standards and to adjust the own production processes to the new requirements. When the outline of the guidelines was becoming clearer S. asked its suppliers to give their opinion about which of their products would be compatible with the new standard and which would not. On the basis of these analyses which were only provided after fierce intervention from S., brainstorming processes about the alteration of the product and production patterns were initiated by the management and masters of S.. Against the background of existing knowledge in the field of mechanical engineering there was a special focus on a substitution of chemical by mechanical finishing processes. This

brainstorming process and the ensuing changes, in which workers were involved, caused costs between € 25.000 and € 50.000. In 2000 the company additionally has to pay € 2,500 to the Institute for Market Ecology (Sulgen/Switzerland) as a charge for the certification according to the new standard.

Despite the renunciation of external help and beside the doubtful behaviour on the part of suppliers no further problems emerged from the implementation of the initiative. From the company's perspective the carrying out of the programme was successful in ecological (e.g. entire renunciation of artificial resin or formaldehyde) as well as economic terms (improved market position; data on the results was not available).

Ökotex 100 (606): Since 1995 the company has the Ökotex 100 label. No technical changes were necessary. A sample of ordinary production was sent to the test and was certified without problems. No market outcome at all could be recognised since. Nevertheless, Mr. W considers labels to be a good instrument to enhance the production of healthy cloths.

Ökotex 100 (607): Since 1995 the company has the Ökotex 100 label. The demands of Marks&Spencer have been an important force. No important technical changes were necessary. Mr. S is troubled by the fact, that he allways send red samples to the Ökotex-Institute but is allowed to use the label on other colours as well – which are not analysed. During the last years, the company gives more information to customers and is less restrictive with their "secrets". Mr. S considers labels to be a good instrument to enhance transparency of the textile chain.

Substitution of formaldehyde (607): Mr. S mentioned the substitution of formaldehyde, which was critizised by customers due to fishy smell of textiles. The supplier of chemicals came up with the technical solution and help (free of charge) and co-operated with in-house technicians. A sugar based process with implemented. Shop floor workers had to get used to the new process, but no specific qualification took place. Without help of the supplier, this could not have been done. This was an important first environmental milestone in 1996.

Renunciation of chlorine in the bleaching process (602): Faced by an imminent change of the legislative framework in the early 1990s, the management decided to renounce of chlorine in the textile bleaching process. Suppliers from the chemical industry assisted in selecting appropriate substitutes and in rearranging the procedures. Within the company the plan was implemented especially by the relevant production managers who were co-operating with internal experts in this field. No workers of were involved in the carrying out of the measures. The whole process of implementation costing € 125.000 took one year and did not lead to unusual complications.

Questionable substances (612): W&P picked up the environmental discourse of the 70's and substituted questionable substances in their production. The problem as well as the solution was brought up by DYSTER, a supplier of dyes, joint venture of BAYER and HOECHST. They provided further help (of good quality) in the implementation process, along with some suppliers of consumables. However, because of this substitution some color-nuances are no longer available. Mr H says, the company might have implemented the initiative without external help with a good chance of success.

Avoiding toxic use (613): In 1992, G&W substituted dyes due to regulatory pressure. Suppliers came up with possible solutions which were tested by workers. Although there were

some problems with new processes, the results met the company's expectations, and the technologies of the suppliers DYSTER, CAT and WECEMA were implemented. In addition, the amount of input of certain substances was reduced.

Toxic-use reduction (617): From about 1980 to 1997 FP used water-based colours only, but changed to PLASTISOL colours (suppliers: CHT; BAYER), because this technology improved quality while being a "no emissions-" technology. These initiatives were initiated by the suppliers and met an active supporter of eco-friendly behaviour in Mr VH, who is also a hunter and the "eco-representative" of the local Rotary-Club. The "no emissions-"technology was put to the test, when a neighbour accused Mr VH to illegally emit substances into a nearby stream. Mr VH immediately bought a water separator for 15,000 Euro. However, the "substances" were tested and found to be pesticides from a nearby farm. Since 1996 FP only sell products with Eco-tex 100 label.

Environmental communication and co-operation (618): Eco-tex-100-Labels are being used since 1995. However, Mr D argued that Eco-tex was more interested in maximising profit rather than environmental performance of products, for example when 'buying out' other labels. He questioned criteria as, for example, an apple contains 4 times as much formaldehyde as is allowed for textiles following Eco-tex-standards. In addition he found the results of their tests rather arbitrary; the same samples were sometimes found to contain too much formaldehyde, but were found to be okay when sent in again ("maybe someone at Eco-tex smoked a cigarette handling our sample...").

Avoiding toxic and water polluting processes (619): The single most important initiative took place while establishing the company in 1969: the implementation of thermal printing, which needs a fair amount of paper for transfer, but no water and solvents.

Initially, the Z family ran a medium sized machine- and plant-engineering company. In the late 60's, this company manufactured the first thermal-printing-machines for the textile industry under license from SUBLISTATIC, France. The machines delivered a good performance, but textile companies didn't buy, because the technique was "rather complicated"; while the amount of consumables and other substances needed was dramatically lower, the labour costs would have been relatively higher.

As Mr Z's father was very much convinced of the technology, he used the acquired know-how and established without further external help a small independent company, ZTP. After starting with subcontracted processing, the company now, as far as clothing is concerned, finishes their own goods. The payback-period for the key machinery was 4 years.

Avoiding toxic use (625): They avoid unnecessary finishings, substitute certain processes and substances and reduce the amount of input where possible. For example, they don't use urea as a drying agent anymore, and apply moisture in a more controlled fashion instead. Sodium hydroxide solution, a by-product of some processes, is used to neutralise CO_2-emissions.

Natural plant colours (639): 5 years ago, they ran a project with LIVOS PFLANZENFARBEN, Wieren, testing plant colours for industrial purposes. All in all they made 4 applications in their own laboratory. The results were rather disillusioning; the technique proved impractical (2,4 – 210g of residue for 600g of fabric, very smelly, limited colour-stability) and thus inappropriate for industrial use.

6.10.8 Water protection

Since most processes are water-based, most firms are active in water saving and protection. Water saving technologies are in most cases profitable.

Water treatment plants also sometimes save money, probably in cases were they substitute an older, more expensive plant.

Save handling and storage of hazardous material due to regulations are necessary, but costly measures of water protection.

	No. of Firms	% of firms	Running costs	
Technology			Up	down
Water saving production technology	22	73,3	2	16
Hazardous material storage	15	50,0	5	0
Water treatment plant	13	43,3	5	4
other	6	20,0	0	1

Tab. 6.61: Water protection and efficiency initiatives (FTF)

Water protection (610): The water treatment plant cost 600,000 Euro. Further water saving technology was implemented in 1998 / 99 at costs of 1.5M Euro. This was the idea of Mr B, the technical manager, who implemented the technology with good success with the supplier of machinery, THIES, Coesfeld, and some assistance from workers. No new qualifications where needed and no further problems evolved. The payback period was unknown to Mr B, but supposedly rather short, as the associated savings were high. Mr B could not have implemented the initiative without external help, and would not have tried. Some time before that, in 1997, the water treatment plant was automated for some 125,000 Euro, which again saved substantial amounts of money. A hazardous material storage was acquired by upgrading existing storage space, which cost about 25,000 Euro over a period of 1-2 years.

Water protection (611): Primary milestone of environmental activity was the implementation of a water treatment plant in 1991, which was motivated by new regulations and associated costs. The need for action was realised by the MD, who also developed the initial steps with the help of local authorities (mediocre performance) and the supplier of machinery (FRENZEL, Munich, good performance, Investment 65,000 Euro), who also delivered the technical implementation. New qualifications were acquired via two days of training on the job by FRENZEL. The initiative would not have been possible without external help, and SE would not have tried. The payback period was 6 years.

Water protection (614): In 1999 and 2000 new, water saving washing machines were installed which cost 1M Euro. The issue was raised by the supervisor of the dying department and technical management solved it with the aid of some workers and suppliers of machinery (BABCOCK and KÜSTERS). The payback period was 2 years.

Water protection (629): TS save large amounts of water and money by reusing process water, with only little new inputs to re-establish the appropriate formula (95% decrease in waste water, 1/3 fresh water per production cycle). This is possible because they produce

only a single colour (white), and thus have no changing processes. The implementation cost 75,000 Euro in 1999. This initiative was an idea of technical and general management and a by-product of their concept to reuse waste heat. The devices were developed in-house and are going to pay back in 2 years time.

7 Findings for the Fruit and Vegetable Sector

7.1 The business situation of the firms

The business situation of the firms interviewed seems to be very good. 82.4% expect a profit or a good profit in 2000. Only 8.8% expect a break-even and 5.9% a loss. 64.7% expect a growth in sales, 29.4% stability and 5.9% a fall in sales. There seems to be a lot of optimism within the fruit and vegetable sector, which, as some interviewees stated, has to do with the BSE-crisis. Market expectations for vegetarian food in general and organic food in special are very good and firms are optimistic.

Anyway, on average 75.8% of all machinery was older than 5 years, but only 10.1% older than 10 years. Very few companies were equipped with new machinery, but it has to be considered, that fruit and vegetable processing is not that innovative. Machinery will often only be replaced when completely worn.

Age of machinery	Av. Percentage
< 2 years	9,1
< 5 years	15,1
< 10 years	65,7
> 10 years	10,1

Tab. 7.1: Average percentage of machinery by age group (FTF)
(calculated weighting machinery age of the firms by number of employees of the firms)

The most important factors of competitiveness as seen by the interviewees are given in table 7.2. Quality and price are most important, but service is an unavoidable background factor.

Factor	Advantage			
	1.	2.	3.	Sum
Quality	17	13	3	33
Service		6	13	19
Price	12	5	1	18
Variety	4	2	4	10
Marketing		4	3	7
labour quality	1	2	1	4
Environment		2	1	3
Suppliers			2	2
availability of counselling			2	2
Labour supply			2	2
capital availability				0
Speed of delivery				0

Tab. 7.2: Factors for competitiveness (FTF)

62,4 % respectively 58,3 % of the companies regard their profitability and their value-added per employee as 'on the average'. Compared to the textile sector, firms regard profitability as well as value-added more positively.

Profitability	Number of firms	% of firms	% of firms 1-99	% of firms 100-500
Below average	21	20.8	23.3	6.7
Average	63	62.4	59.3	80.0
Above average	17	16.8	17.4	13.3
Total	101	100.0	100.0	100.0

Tab. 7.3: Firm profitability and firm size (PQ)

Value-added	Number of firms	% of firms	% of firms 1-99	% of firms 100-500
Below average	22	22.9	25.9	6.7
Average	56	58.3	58.0	60.0
Above average	18	18.8	16.1	33.3
Total	96	100.0	100.0	100.0

Tab. 7.4: Value-added per employee and firm size (PQ)

The sample firms are making 7.0 % of their turnover in foreign markets (5.3 % within the EU, 1,7 % outside the Union); 52.4 % of the turnover are coming from sales in the home region of the companies and 40.6 % from sales in the national market. As far as exports are concerned, it becomes obvious that 67 companies in the PQ-sample do not export at all, that 19 companies only sell up to 10 % of their products outside the German border, and that merely 3 firms have an export level of more than 50 %. Considering this weak

export rate, the German fruit and vegetable processing industry can be characterised as a branch which is predominantly focused on the national and regional market. Table 7.5 summarises these findings:

Sales regional		**Sales national**		**Total exports**		**Export within EU**		**Exports outside EU**	
% of sales	No. of firms	% of sales	No. of firms	% of sales	No. of firms	% of sales	No. of firms	% of sales	No. of firms
0	21	0	36	0	67	0	67	0	81
1-10	11	1-10	4	1-10	19	1-10	22	1-10	16
11-20	6	11-20	5	11-20	5	11-20	5	11-20	5
21-30	3	21-30	4	21-30	4	21-30	3	21-30	-
31-50	9	31-50	13	31-50	4	31-50	4	31-50	-
51-70	7	51-70	11	51-70	2	51-70	-	51-70	-
71-90	8	71-90	17	71-90	-	71-90	1	71-90	-
91-100	37	91-100	12	91-100	1	91-100	-	91-100	-
Total	102	Total	102	Total	102	Total	102	Total	102
Re-gional sales in % of total sales	52.4	National sales in % of total sales	40.6	Export in % of total sales	7.0	Export within EU in % of total sales	5.3	Export outside EU in % of total sales	1.7

Tab. 7.5: Regions of Activity (PQ)

It is now possible to rank the different sample firms according to the strength of their export market position on the basis of the data of the regions of activity. In order to determine the ranking of the firms' export (as measure of competitiveness), it is necessary to split them into 5 groups, ranging from a low level of national sales to high export rates.[19] The sample firms can be divided roughly into two export groups: 66 companies rank low and 35 companies rank high (see table 7.6).

When observing the relationship between export (as measure of competitiveness) and firm size, it becomes clear that even smaller companies are selling products outside Germany, and that with a growing number of employees the portion of companies without any exports or with poor export rates is diminishing steadily. But still one out of four firms with more than 50 employees is not doing business in foreign markets.

[19] Group 1: no exports, national sales = 0 % - 10 %; group 2: no exports, national sales = 11 % - 100 %; group 3: exports = 1 % - 9 %; group 4: exports = 10 % - 19 %; group 5: exports = 20 % - 100 %

			Employees of firms					
Competitiveness rank	% of firms	No. of firms	1-10	11-25	26-50	51-100	101-250	251-500
No exports, national sales = 0% - 10%	-	-	-	-	-	-	-	
No exports, national sales = 11% - 100%	65.3	66	45	13	4	1	2	1
Exports = 1% - 9%	9.9	10	3	2	2	2	-	1
Exports = 10% - 19%	10.9	11	2	2	2	1	2	2
Exports = 20% - 100%	13.9	14	1	3	2	4	2	2
Total	100.0	101	51	20	10	8	6	6

Tab. 7.6: Exports and firm size (PQ)

Most companies in this sector have virtually no R&D capacities. Just three firms (of 13 with more than 100 employees) have more than 5 people doing R&D. 76 have no R&D at all. In the most small firms this is explained by the fact, that they are producing “historically” simple foodstuffs like fruit juices, peeled potatoes, ready to cook vegetables and so on. Just the bigger companies are producing packed food for the big retailers and have to show up with new (so-called) product ideas, e. g. “Potatoes Bavarian Style in Sweet Almond and Ale Sauce”.

No. of people	0	1-2	3-5	6-10	11-20	21 plus	Total
Full time	76	16	7	1	1	1	102
Part time	76	24	2	-	-	-	102

Tab. 7.7: R&D capacity (PQ)

7.2 The Output-Hypothesises

7.2.1 Environmental Performance

To build a basis for cross tabulating the environmental performance of firms with other factors it is necessary to rank the firms according to their environmental performance. Fpr the PQ, we formed three groups **compliance** (0 - 2 initiatives), **compliance plus** (3 - 5 initiatives) and **excellence** (6 - 11 initiatives).

Only 28 % of the firms are members of the group “compliance”, and half of the companies have an environmental performance that is excellent.

Rank	Number of firms	% of firms	Average number of initiatives
compliance	28	25.9	1.1
Compliance +	30	27.8	4.3
excellence	50	46.3	7.8
total	108	100.0	(Max. 11 initiatives)

Tab. 7.8: Environmental performance ranking (PQ)

The majority of FTF-firms belongs to the compliance+ and excellence groups[20]. However, the excellence firms do not dominate as in our postal survey. It is important to note, that the compliance firms are considerably smaller (average 9.4 employees) than the other two groups (c+: 54 employees, excellence: 73 employees).

Rank	Number of firms	% of firms	Average number of initiatives
Compliance	5	14.7	3.8
Compliance plus	18	52.9	5.9
Excellence	11	32.4	9.0
Total	34	100.0	6.6

Tab. 7.9: Environmental performance ranking (FTF, max. 11 initiatives)

7.2.2 Relationships between Environmental Performance and Economic structure- and performance-indicators

There is a distinct relationship between firm size and environmental performance insofar as the portion of firms belonging to the “excellence” group is increasing with growing firm size.

	Rank	1-10	11-25	26-50	51-100	101-250	251-500	All responses
No. of firms	compliance	24	3	-	-	-	-	27
	compliance +	14	7	4	3	2	-	30
	excellence	14	10	8	7	6	5	50
	total firms	52	20	12	10	8	5	107

Tab. 7.10: Environmental performance and firm size (PQ)

Larger companies do not only have a better environmental performance than smaller ones, they are also in a better position as far as some economic parameters are concerned. Therefore a positive relationship between economic parameters and environmental performance can be assumed: the better the first variable, the better should be the latter correspondingly. Table 7.11 creates the impression, that excellent firms are more likely to have an above average profit, and table 7.12 shows, that they create this profit by average value-added per employee.

[20] Ranking scheme see chapter 2.1.1

Profitability Rank	compliance	compliance +	excellence	All responses
below average	6	7	8	21
equal to average	15	18	30	63
above average	3	3	11	17
Total firms	24	28	49	101

Tab. 7.11: Profitability and environmental performance (PQ)

Value added Rank	compliance	compliance +	excellence	All responses
below average	4	6	12	22
equal to average	10	18	28	56
above average	4	2	12	18
Total firms	18	26	52	96

Tab. 7.12: Value-added per employee and environmental performance (PQ)

Just 40.3 % of the non exporters are excellent, but 68.6 % of the exporters. Since the majority of the exporters are small firms, this is unlikely to be an effect of size alone. Correlations could be found between the export rating of the firms and value added per capita (0,532/ sign. 0,004) and turnover per capita (0,504/ sign. 0,003). This might be the cause of success in foreign markets.

Rank	compliance	compliance +	Excellence	All responses
No exports, national sales = 0% - 10%	-	-	-	-
No exports, national sales = 11% - 100%	20	20	27	67
Exports = 1% - 9%	3	2	6	11
Exports = 10% - 19%	1	3	7	11
Exports = 20% - 100%	1	1	11	13
Total firms	25	26	51	102

Tab. 7.13: Exports and environmental performance (PQ)

There are some facts from our face-to-face-interviews supporting our hypothesis, that firms with a good environmental performance will also show above average performance in economic terms, yet a number of plausible indicators show no clear tendency. It should not surprise too much that, for example, most correlations fail to support significant tendencies. With our given (small) sample size we must ultimately fail to prove or even discover weak influences. Ambiguous influences are a problem, too, because we have to

split up our sample further to find, e.g. linear relationships that change their gradient angle or even direction from one segment to the other. Nevertheless, a number of facts that lead to interesting conclusions have been found.

Table 7.14 shows, that all five compliance firms are small while c+ and excellence firms can be found in (nearly) each size group.

	Rank	1-10	11-25	26-50	51-100	101-250	251-500
No. of firms	Compliance	3	2	0	0	0	0
	Compliance +	9	1	1	4	2	1
	Excellence	3	3	1	3	0	1

Tab. 7.14: Environmental performance and firm size (FTF)

The five small compliance firms are surprisingly the strongest exporters. This is due to one firm, which is the strongest overall exporter and exports 65% of turnover to EU countries.

Export Rank	Compliance	Compliance+	Excellence	Total
No Exports, national sales 100%	3	9	5	17
Exports = 1%-9%	1	2	4	7
Exports = 10%-19%	0	4	0	4
Exports = 20%-100%	1	3	2	6
Av. Export Rating[21]	70 Pts.	58 Pts.	54 Pts.	59 Pts.

Tab. 7.15: Exports in the Performance Groups (FTF)

Table 7.16 provides an overview on relevant economic indicators. It shows, that turnover of c+ firms is high because of high raw material cost. Value added per capita is much closer together in all three groups, but excellence firms lack performance. Also in export, performance of excellence firms is low. But they are growing more than the average. The development staff is relatively higher (although 70 of altogether 84,5 R&D persons are employed by just two firms). In the excellence firms, we are obviously facing a strong growing group of firms, which still lack efficiency and export.

[21] Defined as: (regional sales*0) + (national sales) + (EU sales*2) + (non-EU-Europe*3) + (other countries*4)

	Compl	Compl+	Excell	All Firms
Av. Turnover (Euro)	1.200.000	12.443.000	7.385.000	9.430.000
Av. Productivity per capita (Euro)	128.000	231.000	101.000	176.000
Av. Value Added per capita (Euro)[22]	81.000	88.000	83.000	86.000
Av. Level of exports %	13,2	6,8	4,9	7,1
Av. Employment 1999	9,4	53,9	73,4	53,7
Av. Employment Growth 1994-1999 in % and per year in %	14,6 2,7	9,3 1,8	20,5 3,8	14,1 2,6
Av. Development Staff %	2,1	2,6	6,6	4,5
Av. Qualified Staff / Staff %	44,4	45,2	51,1	46,9
Av. Worker Wage (Euro per hour)	7,2	10,6	9,2	9,1
Av. Age of machinery (years)	9,2	5,6	6,5	6,4
Sample Size	5	18	11	34
Av No of Initiatives	3,8	5,9	9,0	6,6

Tab. 7.16: Environmental Performance (Ranking Score) and Economic Performance Indicators (FTF)

Some correlations have been calculated, but nearly all of them fail to prove any significance.

Indicator	Compliance	Compliance+	Excellence	Total
Export Rating	not significant	not significant	Not significant	not significant
Percentual change in employment (99-94)	not significant	not significant	Not significant	not significant
Productivity per employee	not significant	not significant	0,832 sign. 0,001	not significant
Value-Added per Employee	not significant	not significant	0,903 sign. 0,001	not significant

Tab. 7.17: Correlations between Environmental Performance (Ranking Score) and Economic Performance Indicators

It could be argued that the effects shown are only a result of the bigger size of compliance+ and excellent firms compared to compliance firms. A matched pairs analysis of 10 pairs of compliance+ and excellence firms of similar size and product range resulted in the following table:

[22] The value added of two excellent wineries with two respectively seven employees was so small, that they have been taken out of the sample for calculating the value added average.

	Compl+	Excellence
Av. Turnover (T. Euro)	15,000	6,700
Av. Turnover per capita (Euro)	183,800	92,900
Av. Value Added per capita (Euro) [23]	108,100	73,500
Av. Level of exports %	9,3	5,2
Av. Employment 1999	60,3	72,7
Av. Employment Growth 1994-1999 in % (based on sum values for the group)	-8,4	12,4
Av. Employment Growth 1994-1999 in % (based on individual percentages)	13,3	231,7
Percentage of firms in the group expecting growth in the forthcoming three years	70	90
Percentage of firms in the group expecting profit in the next year	80	60
Av. Development Staff %	3.4	4,3
Av. Qualified Staff / Staff %	53,6	50,9
Av. Age of machinery (years)	4,6	6,3
Sample Size	10	10

Tab. 7.18: Environmental Performance (Ranking Score) and Economic Performance Indicators of eleven matched pairs

Measured against the indicators growth and development staff the analysis of matched pairs shows that environmental initiatives have a positive economic effect. But regarding all other indicators the excellent firms rank lower and form a strong growing group of firms, which still lack efficiency and export. In principle, these results do not vary from the results which were obtained by comparing the complete performance groups.

There are 12 firms in the sample which process 50% or more organic raw material. Seven of these firms claim a product oriented strategy, two claim a market oriented strategy. Two of the firms are startups (no employees in 1994). Three have grown by more than 50% since 1994. 83% of these firms expect growth within the next years while only 54% of the non-eco-firms expect growth. Concerning profit, these firms perform as good as the others. Eight of them belong to the excellence group, four of them are compliance+ firms. They process an average of 91% fresh fruit and vegetables compared to 78% of the non-eco-companies.

In the export ranking, the excellence group performs rather bad, but the 12 eco-firms (>50% organic raw material) have an average export rating of 72 Points. Within the pro-active firms there is some evidence, that the eco-firms form a small group of “hidden champions”.

[23] The value added of two excellent wineries with two respectively seven employees was so small, that they have been taken out of the sample for calculating the value added average.

7.2.3 Impact-evaluation of environmental initiatives by the sample firms

Relating performance-indicators to each other is a valuable method of generating more or less objective information about respondents' behaviour. However, to achieve a higher degree of predictability as well as adequacy of policy-advice, it is necessary to depict the point of view of our interviewees.

They were asked to express their perceptions e.g. of the consequences of the undertaken environmental initiatives and the most influential driver in the initiatives' adoption. One has to be careful about the degree of subjectivity of these statements, but they should reveal possible starting points for policies in this economic sector.

To take a look at concrete environmental measures is a necessary step. Doing so, one can observe that 108 companies in the PQ-sample mentioned a total number of 566 initiatives. The average number of initiatives per firm therefore is 5.24. Only 7 firms did not adopt any initiative at all in the past, whereas nearly 39 % of the 108 companies carried out between 5 and 7 environmental initiatives (see table 7.19).

No. of initiatives	% of firms	No. of firms	Total no. of initiatives
0	6.5	7	0
1	11.1	12	14
2	8.3	9	20
3	7.4	8	25
4	5.6	6	25
5	14.8	16	83
6	13.0	14	87
7	11.1	12	87
8	7.4	8	65
9	6.5	7	64
10	4.6	5	51
11	3.7	4	45
Total	100.00	108	566

Tab. 7.19: Number of Environmental Initiatives (PQ)

The degree of diffusion of the single types of initiatives is slightly different (see table 7.20) with waste separation being mentioned by almost the whole group of our sample firms. It is striking however that even with regard to the other initiatives - with the exception of environmental management, organic products and environmental reporting - a widespread usage can be stated. It is of great interest now to analyse the factors referred to by the companies as the drivers behind the environmental measures. When counting how often each factor was mentioned, three drivers seem quite important: regulation was mentioned 216 times as a reason for an initiative, cost 177 times and market 151 times. Only with regard to health and safety, which was referred to 106 times as a reason, one can say that this factor has at first glance less relevance.

But the importance of the drivers for single initiatives differ a lot. It is quite clear, that only water and energy efficiency are cost driven. All the other site related initiatives are enforced by regulation, which is overall the predominate driver. But regulation achieves very

little in order to promote four other initiatives, which are predominantly market driven. It may thus be stated, that different drivers are necessary to get the companies moving in all necessary fields of activity.

Initiative	Number of firms	% of firms	Main reason	Two main reasons
Waste separation	96	88.9	Regulation	Reg. 62 Cost 36
Regional sourcing	63	58.3	Market	Market 32 Cost 23
Storage haz. sub-stances	62	57.4	Regulation	Reg. 44 H&S 27
Returnable package	59	54.6	Market	Market 33 Cost 15
Avoiding chem. Ingred.	54	50.0	Market	Market 29 Reg. 17
Energy efficiency	48	44.4	Cost	Cost 36 Reg. 10
Waste water treatment	46	42.6	Regulation	Reg. 32 Cost 20
Water efficiency	45	41.7	Cost	Cost 36 Reg. 7
Environmental man-agement	38	35.2	Regulation	Reg. 16 Market 12
Organic products	33	30.6	Market	Market 22 H&S 7
Environmental report	22	20.4	Regulation/Market	Reg. 11 Market 11

Tab. 7.20: Kind of Initiative and Main Reasons (PQ)

It is one of the most common arguments of optimistic environmental and economical researchers regarding environmental initiatives that such activities will lead to benefits in both environmental as well as economic terms (win-win-situation). The firms responding to the German short questionnaire do not clearly confirm this assumption. But the opposite cant be stated either. More labour and more cost alone do not account for overall economic burdens, but generally indicate, that work is to be done and paid for. Better sales are a first success indicator, but profits are sometimes going up as well as down. Not all companies seem to make a success from the initiatives. If there is any tendency in the economic impact at all, it might be seen as slightly positive.

Initiative	Labour		Costs		Sales		Profits		Productivity	
	Up	Down	Up	Down	Up	Down	Up	Down	Up	Down
Waste separation	43	3	33	26	7	6	18	21	7	9
Regional sourcing	18	4	12	20	27	2	26	7	13	5
Storage haz. substances	21	1	29	2	1	5	1	12	4	7
Returnable package	18	4	21	7	15	2	11	14	3	10
Avoiding chem. ingred.	7	3	11	4	13	2	8	4	7	6
Energy efficiency	8	1	9	23	4	2	17	3	11	2
Waste water treatment	15	2	17	12	1	3	8	16	4	4
Water efficiency	8	-	6	26	1	3	18	7	8	1
Environmental management	18	-	22	2	6	3	2	14	5	7
Organic products	10	-	16	-	17	1	12	4	4	4
Environmental report	9	-	11	-	3	1	-	4	-	5
Total	175	18	187	122	95	30	121	106	66	60

Tab. 7.21: Economic Impact of Environmental Initiatives (PQ)

Compared to the high burden of labour and cost, productivity and profit develop rather well.

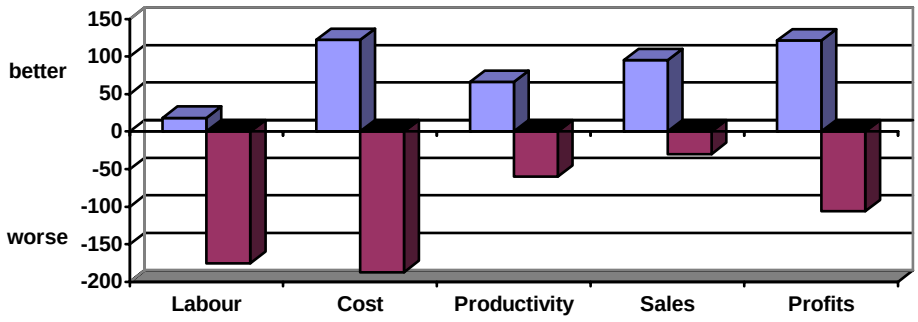


Fig. 7.1: "better" or "worse" weightings summed up for all initiatives (PQ)

Regional sourcing seems to be the economic champion of all initiatives. In many cases it has a positive impact on cost, sales and profits and, surprisingly, it is seen to improve productivity. The work invested in regional sourcing seems to pay well. Energy and water efficiency seem to have a simple cost down, profit up outcome. Organic products are expensive and work intensive to produce, but in many cases they increase sales and profits as well.

Initiative	compliance	compliance +	excellence
Waste separation	16	28	50
Regional sourcing	1	19	43
Storage haz. substances	2	14	46
Returnable package	4	14	41
Avoiding chem. ingred.	3	8	43
Energy efficiency	-	11	37
Waste water treatment	1	13	32
Water efficiency	-	8	37
Environmental management	-	6	32
Organic products	1	4	28
Environmental report	-	2	20
Total	28	127	409
Number of firms	28	30	50
Number of initiatives per firm	1.00	4.23	8.18

Tab. 7.22: Initiatives and environmental ranking (PQ)

A look on the relationship between environmental initiatives and environmental ranking clearly shows, that “excellence” firms carry out many more initiatives than “compliance” and “compliance plus” firms. It can be seen, that compliance+ firms improve, compared to the compliance group, on the initiatives driven by regulation and cost. They are considerably lacking market driven and management related initiatives compared to the excellence group. Only regional sourcing is quite fashionable in the compliance+ group as well.

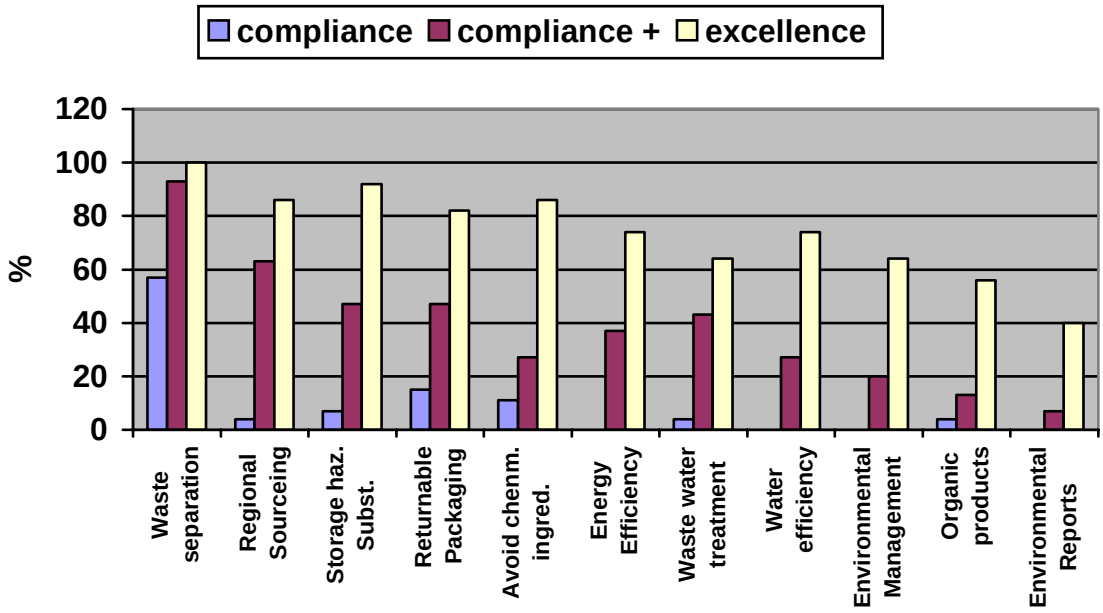


Fig. 7.2: Percentage of firms carrying out the initiatives (PQ)

The Distribution of the numbers of initiatives across the FTF-firms shows roughly the same characteristics as the PQ-sample; but no companies fall into the low number–categories. However, the ‘center’ has moved slightly towards the upper categories (see table 7.23). It is possible that there is a small bias towards more “environment-friendly” companies.

No. of initia-tives	% of firms	No. of firms	Total no. of initiatives
0	0		0
1	0		0
2	0		0
3	8,8	3	9
4	8,8	3	12
5	17,6	6	30
6	14,7	5	30
7	14,7	5	35
8	8,8	3	24
9	17,6	6	54
10	5,9	2	20
11	2,9	1	11
Total	100,0	34	225

Tab. 7.23: Number of Environmental Initiatives (FTF)

As for the frequencies of and drivers for specific initiatives, there are some remarkable differences between the PQ and FTF samples (see tables 7.20 and 7.24). In the PQ, five initiatives were seen as mainly regulation driven, four mainly market driven and two mainly cost driven. In the FTF, all initiatives were seen either market (5) or cost (3) driven. Regulation is only seen as a co-driver.

This may in part be due to the fact that the PQ- and FTF-questionnaires show slightly different approaches. Namely, some initiatives are approached with a wider focus in the FTF-interviews, so that drivers are given for a number of initiatives, and it is not possible to relate the reported driver to a single initiative. On the other hand, most interviewees had access to additional information from the interviewer, which is not true for the respondents of the PQ. But we feel, that a strong self consciousness of the interviewed FTF-firm representatives leading to more cost reducing and market activities might be important. They might as well see themselves as independently active, even if they were in fact regulation driven in some cases.

Initiative	Number of firms	% of firms	Main reason	Two main reasons (%)
avoiding Artificial Ingredients	32	94,1	Market	Market 15 Regulation 8
Water saving and water protection	31	91,2	Cost	Cost 12 Regulation 7
Packaging	30	88,2	Market	Market 19 Other 7
Energy efficiency	23	67,6	Cost	Cost 13 Other 4
Organic raw material	23	67,6	Market	Market 13 Other 9
Waste separation	17	50,0	Cost	Cost 18 Regulation 8
Env. Communication	13	38,3	Market	Market 20 Other 7
Environmental management[24]	6	17,6	Market	Market 10 Regulation / Cost 1

Tab. 7.24: Kind of Initiative and Main Reasons (FTF)

Obvious is the importance given to the market as a driver of environmental initiatives (see figure 7.3). As it seems, the firms willing to give an interview are more market-oriented than the firms in the PQ-sample. While cost drivers are seen as equally important, regulation as well as health and safety are less important for starting initiatives in the FTF-firms.

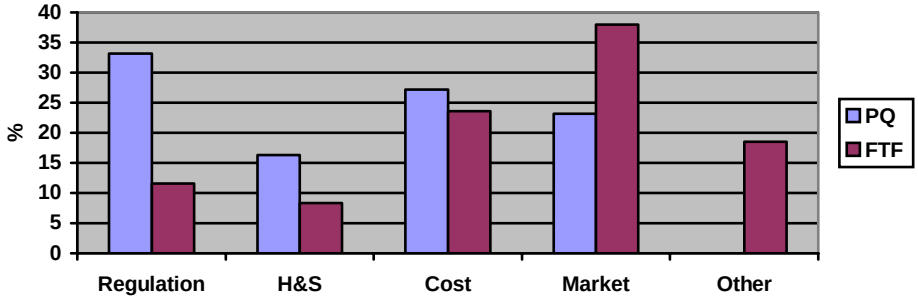


Fig. 7.3: Relative importance of drivers in PQ and FTF

We have asked our respondents to comment on the economic impacts of a number of initiatives (see table 7.25). Only 297 “better” or “worse” weightings were made, but 1376 would have been possible. Considering the fact, that the interviewees gave “better” or “worse” weightings only in 1 out of 5 variables, the result is not too clear. The interviewees

24 Only companies were counted who had implemented a kind of “management system” in the sense of ISO 14001 or EMAS . The drivers were also given for implementations of environmental teams, env. managers, env. policies or programmes.

showed a quite remarkable tendency towards the statement “this aspect did not change at all”. We suppose that they expressed their true feelings, but it should not surprise that SME (missing substantial controlling-capacities) quite often perceive mostly very obvious consequences, i.e. strong consequences with a short time lag. This is to say that one should not be too much exasperated about the relatively small number of quoted tendencies. In our opinion the remaining numbers reflect the more drastic cases. Their distribution should however be capable of delivering a good impression of the feelings of the managers.

	Labour		**Cost**		**Price**		**Sales**		**Position**		**Compeli.**		**Profit**		**Image**		
	up	do	bet	wor	bet	wor	bet	wor	bet	wor	bet	wor	bet	wor	bet	wor	
avoiding Artificial Ingredients	0	0	2	0	0	1	0	0	1	0	1	0	0	0	1	0	**6**
Water saving and water protection	1	1	7	6	4	2	0	1	1	1	1	1	7	2	7	0	**42**
Packaging	1	1	2	2	3	0	3	1	3	1	4	1	2	1	5	0	**30**
Energy efficiency	0	1	8	4	3	0	1	0	3	0	2	0	7	0	9	0	**38**
Organic raw material	5	0	0	8	4	2	8	0	9	0	7	0	4	0	10	0	**57**
Waste separation	3	0	0	3	5	1	1	0	1	0	2	0	5	1	11	0	**33**
Environmental management	0	0	1	1	2	0	1	0	1	0	3	0	3	0	1	0	**13**
Env. Communi-cation	5	0	0	4	4	1	15	0	14	0	11	0	7	0	17	0	**78**
Total	**15**	**3**	**20**	**28**	**25**	**7**	**29**	**2**	**33**	**2**	**31**	**2**	**35**	**4**	**61**	**0**	**297**

Tab. 7.25: Economic Impact of Environmental Initiatives (FTF)

Three groups of initiatives may be identified from the FTF:

A. Energy efficiency initiatives as well as some of the water saving (and sometimes water protection) initiatives tend to decrease cost and have subsequently a positive effect on profits. Both initiatives are widely seen as cost driven.

B. Communication and organic products need labour input, increase cost, but foster image, position in the market, sales and competitiveness. They can be characterised as market related. They are seen as mainly market driven.

C. Waste separation and packaging have less impact. Environmental management and avoiding of artificial ingredients in the view of the interviewees have nearly no economic impact at all.

In the frist two groups, there is a good correspondence between reasons and outcome of the initiatives.

All in all, environmental initiatives increase labour demand a little. They sometimes cost and sometimes save money. Yet they may pay back through increased sales in conjunc-

tion with a sometimes better product price. A better image, position in the market and ultimately competitiveness may be achieved. This in turn may increase profitability.

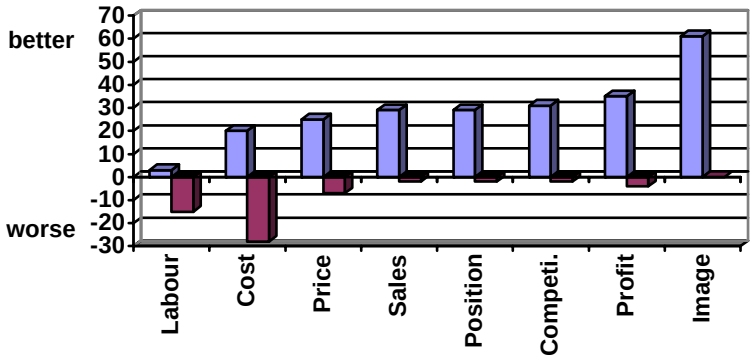


Fig. 7.4: "better" or "worse" weightings summed up for all initiatives (FTF)

Another question is the distribution of implemented initiatives across the environmental performance groups. (see table 7.26 and figure 7.5). By definition, that excellent firms carry out more initiatives than the other groups, but the distribution of initiatives is interesting. It is not surprising, that nearly no company used artificial ingredients. While these substances are often used for convenience products, there is not much of a usefulness when producing frozen vegetables or bottled juices. Food colours, preservatives or taste intensifiers are not necessary and normally not in use.

Returnable packaging or PE-film are used in nearly all firms.

The highly regulated waste water treatment is common in most compliance+ and excellence firms while waste separation, though highly regulated, is not properly attended to in compliance and compliance+ firms[25].

[25] Waste separation was only counted as initiative if five or more waste streams were separated. This would usually be household type waste, organic waste, paper and cardboard, PE-film and glass. These types are usually separated in a common German private households.

Initiative	compliance (5)	compliance + (18)	excellence (11)
Environmental Management	0	1	5
Environmental Communication	0	4	9
Organic Raw Material	0	12	11
Waste Separation	2	8	7
Energy Efficiency	2	13	8
Packaging	4	16	10
Avoiding Artificial Ingredients	5	17	10
Water Protection	3	17	11
Total	17	94	73
Number of firms	5	18	11
Initiatives per firm	3.4	5.2	6.6

Tab. 7.26: Initiatives and environmental ranking (FTF)

Energy efficiency is obviously a question of capital and only two of the five compliance firms have already shown some activity.

Organic raw material and products, environmental management and communications are areas, where excellence firms differentiate from the rest.

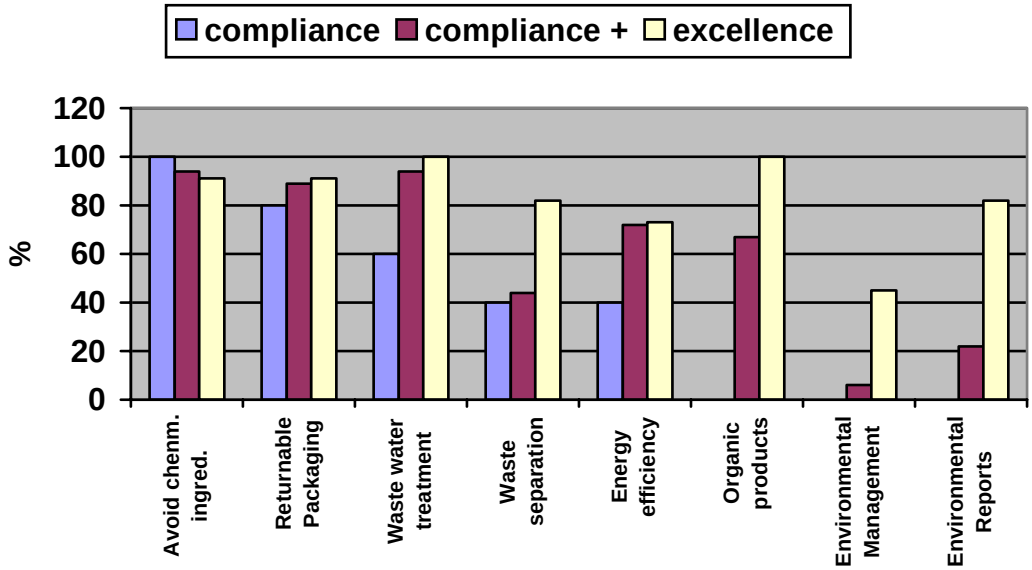


Fig. 7.5: Initiatives carried out by the performance groups (FTF)

7.3 The Input Hypothesises

7.3.1 Environmental Strategies and Attitudes

"Complying with regulations", "reducing costs" and "Improving brand image by eco-practices" are the most important strategic orientations with respect to environmental concerns. "Improving brand image by eco-products" only followed in fourth position, whereas "developing new markets" was a strategy for only a few companies of the sample.

Main focus	Number of firms	% of firms
Complying with regulations	40	22.9
Reducing costs	40	22.9
Improving brand image by eco-practices	42	24.0
Improving brand image by eco-products	26	14.9
Developing new markets	14	8.0
Not a relevant issue	13	7.3

(More than one answer was possible: N = 175)

Tab. 7.27: Environmental Strategy (PQ)

Table 7.28 shows, that strategy and initiatives are closely related. The main activity of the groups shown in figure 7.5 explains quite well the strategies the companies are claiming.

Main focus	Compliance	Compliance+	Excellence	All responses
Regulation	12	10	18	40
Cost savings	7	13	20	40
Improving brand image by eco-practices	6	10	26	42
Improving brand image by eco-products	2	4	20	26
Developing new markets	2	1	11	14
No relevant issue	5	5	3	13
Total firms	34	43	98	175

Tab. 7.28: Environmental Strategy and Environmental Ranking (PQ)

An additional picture of the sector can be drawn by looking at the answers to the question of what constitutes the "most influential factor on final decisions on environmental issues":

Factor	Number of firms	% of firms
Regulations	17	19.6
Customer demands	29	33.3
Management awareness	28	32.2
Cost	13	14.9
Total	87	100.0

Tab. 7.29: Most Influential Factor (PQ)

“Customer demands” and Management awareness” are of highest influence on decisions. Regulations and cost rank considerably lower. This reflects the high percentage of excellence firms, for which regulation does not play an overall driving role. They are focussing on self-initiative and market related activities and, by implementing these, fulfil the regulative requirements as well.

Many of the fruit and vegetable processing firms show a strong personal commitment of management as well. This personal commitment may also be of importance for the data presented in table 7.30.

Main influence	Compliance	Compliance+	Excellence	All firms
Regulation	**5**	6	6	17
Customer demands	**8**	**8**	**13**	29
Management awareness	4	**9**	**15**	28
Cost	2	6	5	13
Total firms	19	29	39	87

Tab. 7.30: Most Influential Factor and Environmental Ranking (PQ)

The view of the interviewees on environmental legislation is rather positive.

Effect	Number of firms	% of firms
Reduced competitiveness	33	36.3
Improved environmental quality	28	30.8
More efficient use of resources	30	32.9
Total	91	100.0

Tab. 7.31: Main Effect of Environmental Legislation (PQ)

Split up in the performance groups it is striking, that the excellence firms have a rather positive view of the effect of environmental legislation.

Effect	Compliance	Compliance+	Excellence	All firms
Reduced competitive-ness	8	14	11	33
Improved environ-mental quality	6	8	14	28
Improved productivity	4	4	22	30
Total firms	18	26	47	91

Tab. 7.32: Main Effect of Environmental Legislation and Environmental Performance (PQ)

When analysing the degree of agreement with the opinion „people worry too much about whether economic development damages the environment“, it seems that about 2/3 of the interviewees have no special environmental values (full and partial agreement = 61,9%).

Degree of agreement	Number of firms	% of firms
Full agreement	11	10.5
Partial agreement	54	51.4
Partial disagreement	18	17.1
Full disagreement	22	21.0
Total	105	100.0

Tab. 7.33: Degree of Agreement with the Statement „People Worry too Much about whether Economic Development Damages the Environment“ (PQ)

Rather surprisingly, no differences between the performance groups can be shown with regard to this question.

Attitude	Compliance	Compliance+	Excellence	All firms
Disagreement (Pro-environment)	10	9	21	40
Agreement (Anti-environment)	15	21	29	65
Total firms	25	30	50	105

Tab. 7.34: Degree of Agreement with the Statement „People Worry too Much about whether Economic Development Damages the Environment“ and Environmental Performance (PQ)

To what extend do the firms of our sample pursue environmental goals? And in what market strategy setting? As our respondents are German SME's, it is not altogether surprising that cost-leadership strategies play a small role: our interviewees supposedly face high labour cost (compared to competitors in other countries) and lack production volume. What remains are differentiation and focussed strategies, which seem to be more attractive to our interview firms (see table 7.35). It might be, that compliance and c+ companies rely more on a specific product (e.g. fresh regional juices) while excellence companies rely more on a specific quality (e.g. organic raw material), with which they differentiate from their competitors.

Groups	Cost Leadership	Differentiation	Focussed	Total
Compl	0 (0%)	1 (20%)	4 (80%)	5
Compl+	2 (11%)	5 (28%)	11 (61%)	18
Excell	2 (18%)	5 (45%)	4 (36%)	11
TOT	4 (12%)	11 ((32%)	19 (56%)	34

Tab. 7.35: Market Strategies and Environmental Performance (FTF)

Table 7.36 shows, that compliance firms often focus their strategy on regulation, compliance+ firms include eco-efficiency as well as eco-product strategies and excellence firms make use of all offered strategies, but without a pronounced highlight.

Groups	Reg	Eco Efficiency	Eco Perf	Eco Product	Eco Market	Not relevant	Total
Compl	**3**	1	0	0	0	1	5
Compl+	3	**5**	0	**7**	0	3	18
Excell	1	3	2	3	2	0	11
TOT	7	9	2	10	2	4	34

Tab. 7.36: Environmental Strategy and Environmental Performance (FTF)

The most important reason to adopt environmental initiatives is, that managers want to contribute to a clean environment. Their own decision is much more important than e. g. in textile finishing, were 42% mentioned legislative reasons. We think, that a closer relationship between nature and food producers might be possible, compared to the highly technological processes in textile finishing.

	Compliance	Compliance +	Excellence	All
adopted because of legislation	2	2	1	5 (15%)
adopted because we want to contribute to a clean environment	2	12	10	24 (73%)
adopted because of clients demands	0	3	0	3 (9%)
Adopted because of other reasons	0	1	0	1 (3%)

Tab. 7.37: What is your company's reason to adopt environmental initiatives? (FTF)

It is striking, that still many of the firms fear reduced competitiveness as main output of legislation.

	Compliance	Compliance +	Excellence	All
Increased efficiency of production	3	1	2	6
improved good of society	3	1	6	10
reduced competitiveness	0	9	4	13

Tab. 7.38: What is in your opinion the impact of German and European legislation for the environment? (FTF)

7.3.2 Skills and environmental performance

It can be seen in table 7.39 that the smaller compliance firms only employ “technical certificate” people in management while the bigger firms have the means to pay people with degrees. C+ and excellence firms have some more workers who have undergone an apprenticeship, but “training on the job” is quite dominant in all groups.

		Degree	Technical National Certificate	Meister	Apprenticeship	On the Job	Employees
employees	compliance	1,0	3,0	1,0	2,3	7,5	14,8
	compliance +	7,8	5,7	5,5	15,9	28,5	63,4
	Excellence	11,1	5,8	4,3	18,0	46,1	85,3
percentages	compliance	6,8	20,2	6,8	15,5	50,7	
	compliance +	12,4	9,0	8,6	25,1	44,9	
	excellence	13,0	6,8	5,0	21,1	54,1	

Tab. 7.39: Qualifications in the FTF-sample

7.3.3 R&D and environmental performance

There is not too much R&D in the sector. Some firms only report cost for external R&D. Looking on the fact, that one compliance+ firm employs 20 in R&D and one excellence firm employs 50, all other 32 firms have 11,5 persons in R&D altogether. The only clear fact is, that nine out of 11 excellence firms achieve environmental ends by R&D while compliance and compliance+ firms do so less often. Seven firms report 5% to 33% of R&D time to be spent on environmental initiatives. One firm reports 100%.

Compliance Groups	firms with R&D		total number of people in R&D	%f firms, who think there is an env Impact of R&D	
	people	cost		yes	no
Compliance	1	2	1	0	2
Compliance-plus	6	6	25,25	5	4
Excellence	7	5	54,5	9	1
TOT	14	13	81,5	14	7

Tab. 7.40: Nature of R&D Function, by Environmental Performance Group (Face to Face Data)

7.3.4 Problems with environmental initiatives

In the opinion of our interviewees, money, or the lack of it, is the most important obstacle to the implementation of env. initiatives. Also the problems 4, 7 and 8 are connected to the availability of financial means.

Uncertainty about the effect of regulations (11.1%) and clean technology (8.6%) are also major problems.

The availability of good suppliers or good advice is not a problem.

But not less than eight companies mention lacking “in house skills” as a problem.

		the 3 most important problems				
		1.	2.	3.	Sum.	Sum. %
1	It is hard to find the capital for investment	16	2	0	18	22,2
2	Clean technology investments do not show an adequate return (payback period is too long)	3	8	1	12	14,8
3	The regulations are too uncertain to plan for new technology	2	2	5	9	11,1
4	We do not have the right skills and expertise in-house (e.g. R&D)	4	3	1	8	9,8
5	Clean technology is still risky and unproven	3	2	3	7	8,6
6	Regulation does not support initiatives	0	1	4	5	6,2
7	Environmental consultancy services cost too much	0	2	2	4	4,9
8	Making a profit is more important than env. protection	1	3	0	4	4,9
9	Management does not have enough time	0	4	0	4	4,9
10	Middle management lacks environmental commitment	1	1	1	3	3,7
11	It is hard to get good advice	0	0	1	1	1,2
12	Suppliers do not provide any help in adopting environmental initiatives	0	1	0	1	1,2
13	Others	2	0	2	4	4,9

Tab. 7.41: Most important problems associated with environmental initiatives (FTF)

The lack of capital will probably be most important for energy and water related initiatives as well as in packaging. For all other types of initiatives it does not seem that important.

Size	Eco-managment	Env. Communication	Eco-Raw Material	Waste Separation	Energy	PKG	Art. Ingredients reduction	Water protection
1-10	250,000	3,000	-	10,150	41,800	178,000	-	88,800
11-25	7,500	26,000	-	20,000	790,000	122,500	-	645,000
26-50	25,000	5,500	-	75,000	0	3,250,000	-	500,000
51-100	25,000	47,400	-	5,300	252,000	900,000	-	368,000
101-250	25,000	0	-	0	25,000	0	-	500,000
251-500	17,500	30,000	-	0	2,500,000	1,000,000	-	2,250,000
TOT	16,700	18,160	-	21,400	264,000	770,000	-	495,000

Tab. 7.42: Average Investment for Firm, by initiative (FTF)

7.3.5 Corporate Culture and Environmental Performance

Usually, economic success is a result of an economic action. These actions are based on decisions and decisions depend on values, opinions and external driving forces. Motivations may arise from personal experiences and opinions, values of society, institutionalised advice and, inside the firm, from young professionals.

Concerning personal values the excellence-interviewees have quite similar environmental values compared to the results of a representative survey by the Umweltbundesamt (Federal Environmental Protection Agency). In this survey pro-environmental opinions with respect to limits of growth and to an estimation of the importance of the ecologic problem are identified.

Questionnaire-Statement: Economic development cannot be supported by the natural resources available.		
	Full Agreement (%)	Full and partial Agreement (%)
Compliance	20,0	40,0
compliance plus	44,7	71,2
Excellence	72,0	90,1
TOT	50,1	73,5
BMU-Statement: Are there limits of growth that our industrialised society already crossed or will reach soon ? (BMU/UBA 2000 p.22)		
	Full and almost full agreement	Full, almost full and partial agreement
TOT	59	90

Tab. 7.43: Environmental values in firms and in society

Questionnaire-Statement: People worry too much about the fact that economic development damages the environment.		
	Full Disagreement (%)	Full and Partial Disagreement (%)
Compliance	20,0	20,0
compliance plus	38,9	50,0
Excellence	63,6	81,8
TOT	44,1	55,9
BMU-Statement: In my opinion, the environmental problem is widely exaggerated by many environmentalists. (BMU/UBA 2000 p.22)		
	Full and almost full disagreement	Full, almost full and partial disagreement
TOT	52	82

Tab. 7.44: Environmental values in firms and in society

It is interesting, that the managers of firms producing organic products, have slightly different views. They disagree even more with statement 7.44 (91,7% full and partial disagreement), but they agree a bit less with statement 7.43 (83,4% full and partial agreement). It might be, that in their view, other natural resources are in question and these are, sustainably grown, available for economic development.

It is as well interesting to see the differences between the FTF-answers and the PQ answers to statement 7.44. A full disagreement of 20,4% and a full and partial disagreement of 37,1% identify the PQ sample to be much less “ecological”.

In contrary to e. g. the textile sector, the values (as far as they are pictured by these two questions) are quite different between the groups. Employees of excellence firms are much more in favour of pro-environmental positions than employees of compliance or compliance+ firms. The excellence-firm managers seem to be as much in favour of the environment as the “population questioned by UBA. The compliance and compliance+ firms appear more conservative.

Environmental values may therefore be an important driver for environmental action of fruit and veg companies in Germany.

An other cultural difference could be employee orientation of the firms. Only slight tendencies could be found (tables 7.45 - 7.47). Comparing compliance and compliance+/ excellence firms, the former seem (conservatively) to foster employees conscientiousness while the latter are striving for responsibilities to be actively taken over by employees on all levels.

	employees conscientiousness	always striving for the best technical solution	that responsibilities are actively taken over by employees on all levels	TOT
compliance	3	1	1	5
compliance +	6	2	10	18
excellence	2	0	9	11
TOT	11	3	20	34

Tab. 7.45: Principles for Economic Success (FTF)

Table 7.46 shows a clear technology orientation in compliance+ firms and some importance of training in excellence firms.

	Cont. Updating of technology	Attention of employees on production	Staff training	Staff orientation of management	TOT
compliance	2 (40%)	3 (60%)	0 (0%)	0 (0%)	5
compliance +	13 (72%)	3 (17%)	1 (6%)	1 (6%)	18
Excellence	4 (36%)	4 (36%)	3 (27%)	0 (0%)	11
TOT	19 (56%)	10 (29%)	4 (12%)	1 (3%)	34

Tab. 7.46: Environmental protection can best be achieved by (FTF)

Table 7.47 makes clear, that outside the bigger c+ firms nearly no people in specific positions are in charge of environmental protection in fruit and veg industry reflecting the small average firm size and the low level of environmental impact. Self initiative of “everyone in some way” is much more important in excellence firms.

	everyone in some way	employees in specific positions	the owner/ director	TOT
compliance	2 (40%)	0 (0%)	3 (60%)	5
compliance +	9 (50%)	3 (17%)	6 (33%)	18
excellence	6 (60%)	0 (0%)	4 (40%)	10
TOT	17 (52%)	3 (9%)	13 (39%)	33

Tab. 7.47: Who is responsible for environmental protection (FTF)

Overall, the opinions regarding the relationship between management and staff seem to be slightly different between the small (conservative) compliance and the bigger (more modern) compliance+/ excellence group.

7.3.6 The Advisors

Regular information is most often drawn from printed matters. Very important sources of information are also:

- suppliers of machinery, which often train the employees to use it while the cost is included in cost of machinery,
- trade unions and employees associations, which often foster working conditions, safety and health by free advice,
- government agencies, which are drifting from a "control police" towards "governmental consultants" because of modernisation of government in the 90th,
- consultants and universities, which do not show up very often in the companies, but their impact might often be on a strategic and important level.

The internet, customers and suppliers of environmental technology and material are also important in at least five to eight companies.

	Firms, which mention "a lot of contacts" in the last year
Journals/ magazines	27
Suppliers machinery	13
Employees associations/ trade unions	12
Regulators/ government agencies	10
Internet	8
Customers	6
Suppliers material	6
Suppliers clean/ environmental technology	5
Universities	4
Consultants	4
NGOs	0

Tab. 7.48: Which are your most important sources of information (measured in number of contacts)

16 firms documented that they made use of free advice. On average, 7% of advice was done by these free advisors. Six firms were content, eight neutral and two were not content with the free advice.

Companies are split up into some, who expect free advice (from the government), some who are willing to pay and some, who expect advice from chambers or trade associations.

For Free	9
With payment for the professional services	10
As a return of the association fee paid to professional association	14

Tab. 7.49: Advice should be provided? (FTF)

The importance of external advice may also be seen in the context of factors promoting environmental initiatives. It is clear, that without enforcement by top management and without environmental consciousness of employees in the firm nothing can or would be moved. Since external know-how is widely available, the first promoting factor which could actually be missing is “capital”. To compensate for missing capital, financial support is consequently seen as another important promoter.

Contacts along the production chain as well as engagement of marketing and procurement departments would usually be expected to be specially important for firms handling organic material. But actually, the non-eco-firms see these promoters as more important. May be, that for the eco-firms, they are self evident.

	very important	**important**	**not important**
Enforcement by top management	17	5	0
Environmental consciousness	14	7	1
External know-how	12	8	2
Capital availability	12	5	5
Internal know-how	10	9	3
Financial support	7	8	7
Contacts along production chain	6	11	5
Engagement of marketing and procurement departments	5	6	11
Companies networks	3	5	14
Research policy of the company	2	5	15

Tab. 7.50: Which were promoting factors for environmental initiatives?

Many results of the interviews with advisors were helpful for understanding the answers of the firms in the FTF-interviews. Bu a couple of impressions are independently important and must therefore be documented here:

- Nearly all suppliers of machinery think, that their products have positive environmental effects and many of them think to offer BAT. They confirm, that the biggest problem of their clients is lack of capital. All of them give advice as to the choice of the right machine and give courses on how to use the machine if it is complex machinery.

- Suppliers of raw material split up in two groups. Suppliers of ordinary fruits and vegetables work under a heavy price competition. They do not have any possibility of differentiation besides quality and time (date) of delivery. Suppliers of organic fruits and vegetables, which are sometimes co-operatives of producers, very often help their clients concerning processing and quality according to the standards of different labels and the EC-regulation on organic food. They also help, as far as possible, in marketing. Co-operation in the product life cycle and the diffusion of know-how seem

to be more important within this comparatively new and rapidly growing organic market.

- Consultants see the main reason for demand of their help in regulation. Most times, the give advice when installing necessary (and sometimes costly) equipment. Surprisingly, they feel, that running costs in their clients firms do not rise. The underlying cost reducing factor is seen by us in context of the fact, that nearly no firm does nowadays build waste water plants or other environmental technology for the first time, but usually older and less cost efficient technology will be replaced.
  Shortcomings in the clients firms are often lack of time or competence to put suggestions into practice. Firm size matters: but sometimes, smaller firms act “as they have always done” and make consultants´ life harder, sometimes, the younger generation of owners fosters modernisation of the firm. When the firm is taken over by the next generation, their certainly seems to be a “window of opportunity” for organisational as well as technical change.
  Competition with state owned advisors exists, but is limited. Easy advice is often delivered by free advisors, but when the going gets tough and a lot of work has to be spent on e.g. the development of new machinery, the high experience and quality of private consultants seems to be indispensable. Looking on a spectrum of consulting problems from easy to complex, the market share of paid private consultants is naturally the high end. Here, they only face universities, which sometimes develop complex technology as well. From our experience in the IÖW it can be expected, that innovative solutions will quite often be developed in co-operation with universities while the diffusion of standard technology will again be the domain of private consultants.

7.4 The hypothesises as part of a system

It may be of use to see the hypothesises as part of an interrelated system of variables. Within the system given in figure 7.6 it is shown by the research, that legislation and market are really an important influence on the environmental initiatives of the fruit and vegetable processing sector. A slight but direct influence of the public could be found, since some relevant help and a bit of opposition by stakeholders was experienced by about half of the firms in the face to face interviews.

The role of the advisors seems like a supporting role rather than a driving role. Limits to the activities of the advisors are set by the ability of the firms to take up and process advice or to find financial sources for bigger investments.

Within the firm, it can be shown that strategy and values (concerning the relationship between management and staff) of the management interrelate with environmental initiatives.

Employees qualifications seem to have at least a small influence. R&D, so not available in all firms, has generally an impact which is higher in c+ and excellence firms.

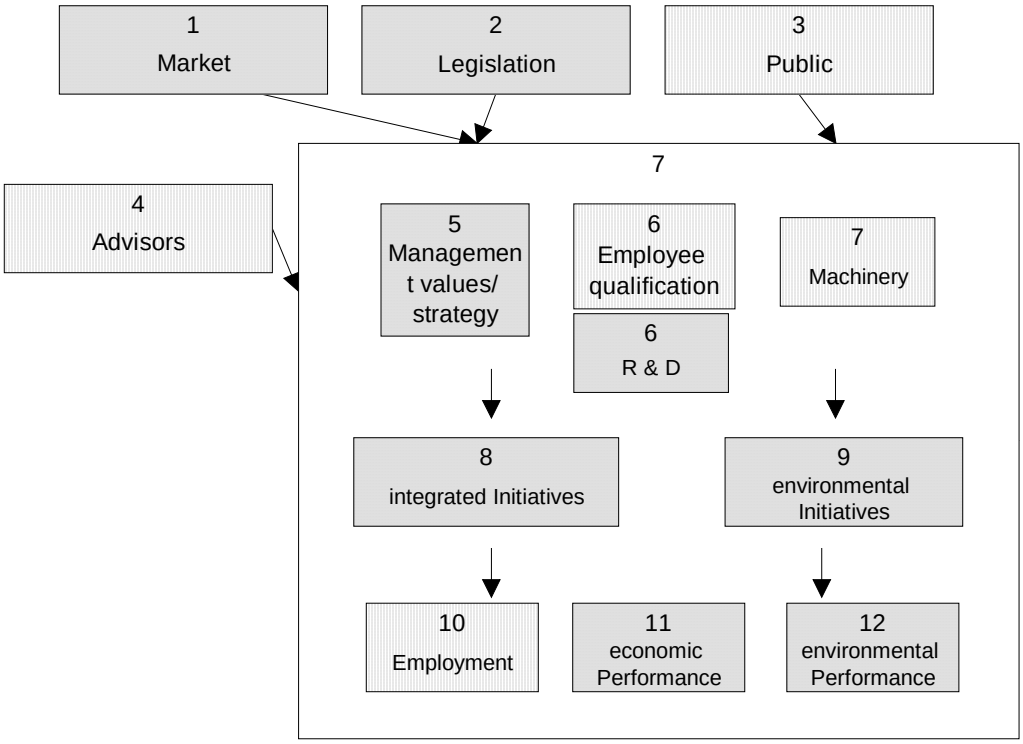


Fig. 7.6: A model of the company (important variables dark)

Most economic indicators rise – at least in some cases - by carrying out environmental and integrated initiatives. It could therefore be shown, that environmental initiatives in the fruit and vegetable processing sector make it possible to overcome the burden of higher cost by better productivity, sometimes higher price and higher sales, better competitiveness and position in the market and finally better profits.

In principle, the variables are interconnected as shown in the figure and - in good firms - lead to the double dividend of profit and environmental performance.

7.5 Environmental Initiatives

There is a lot of information in the answered questionnaires concerning details of initiatives. Stories are very much focussing on aspects, which either need high investments (water protection and saving, energy saving) or are market related.

7.5.1 Environmental Management Systems

3 companies have certified environmental management systems and 3 are planning for one. 9 more companies have quality management systems. Two EMAS validations face just one ISO certificate. The two excellence firms have done their validation in 1996, the one c+ firm did it in 1999.

The driver for any kind of EMS activity was in the PQ seen mainly in regulation (42%), in the FTF the market dominates (two cases) while just one firm mentions regulation as driver for an EMS.

The implementation of an EMS has obviously the function of filling gaps because some of the elements of an EMS are already implemented by many firms. A responsible person has to be appointed in most cases by law, a supplier strategy is necessary to follow elementary ecological market demands as well as mandatory changes such as forbidden substances (figure 7.7).

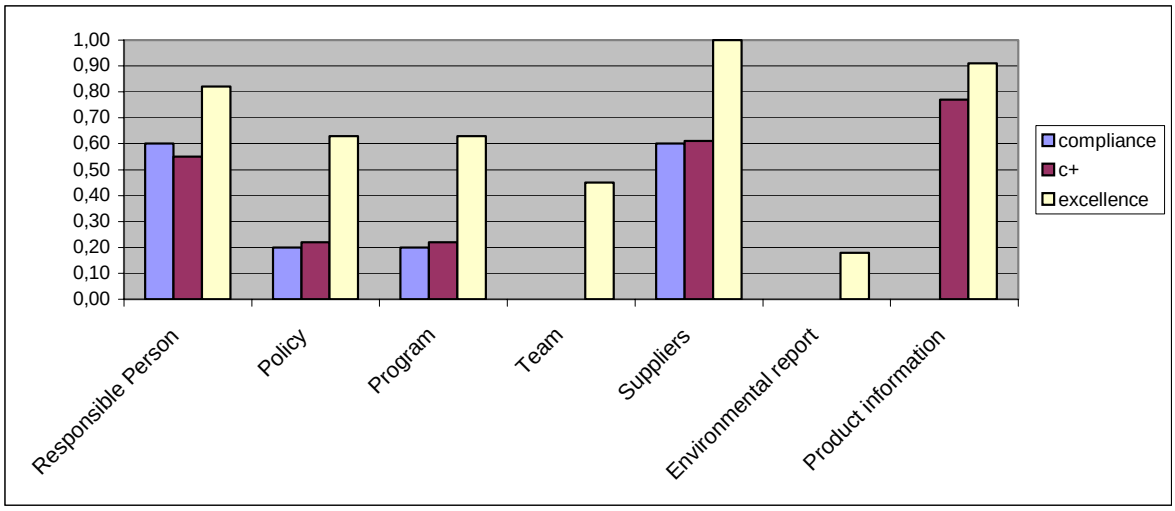


Fig. 7.7: Elements of an EMS in the performance groups

Concerning the usage of financial grants for environmental protection (e.g. investment aid) c+ and excellence firms perform better. They know more about possibilities and are at least able to use them. Six out of 18 c+ firms have profited from aids and three out of 11 excellence firms made us of them.

Environmental Management (10): *Implementation of an EMS.* R's EMS was validated in 1996 following a management initiative. The move was reportedly motivated by company tradition. The management system was then implemented with the help of an external consultant (name withheld; cost: 50,000 Euro) who showed good performance and made a significant contribution to the overall success of the initiative. Though most of the work was done by the environmental manager and the consultant, an additional environmental task force was organised for support. Overall in-house work amounted to 90 work-days. A fundamental problem of the EMS is that the amount of work needed for the maintenance of the system is distributed within the existing staff, which means that a number of people have to work more. Corporate culture changed insofar as the employees have become more aware of costs and the environment.

7.5.2 Environmental communication and co-operation

Environmental communication and co-operation is widely used in the sector. Environmental product communication is most important and guided visitor tours are quite common. But a lot of the excellence firms do also inform in talks and press information. Three companies of 13 active companies report, that new skills are needed.

Environmental communication is seen as market driven and is in the FTF seen as the best means to foster image, position in the market, competitiveness and finally sales. It is also in the top group of profit effective initiatives.

Instrument	compliance (5)	compliance + (18)	excellence (11)
Environmental report/statement	0	0	2
environmental elements in product information	0	14	10
visitors	3	12	11
telephon	0	1	0
press	0	1	6
speeches	0	5	9
sponsoring	1	7	5

Tab. 7.51: Instruments of environmental communication and co-operation(FTF)

As the single sector in the research project, fruit and vegetable processing firms experience opposition and help in marketing by external groups. 16 firms mentioned help in marketing, five opposition. All but one of these cases are c+ and excellence firms.

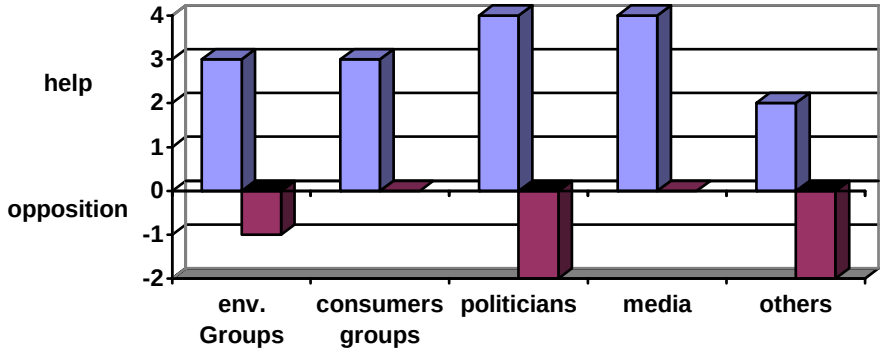


Fig. 7.8: Opposition and help in marketing by stakeholders

Environmental communication and co-operation (04): V are relatively active in this respect: they use environmental product information, guided visitor tours, talks at meetings and conferences (4 days per year) and sponsorships (5,000 Euro p.a.). Directed towards wholesalers/retailers, apart from everyday communication, they use written information without feedback (worth 100-150,000 Euro p.a.) and meetings at fairs (25,000 Euro p.a.). They have had some support from environmental and consumer NGO's as well as the media. Strange enough, local politicians played a rather negative role if any. Mr K saw this somehow connected to a yearly contribution of some 15M Euro from the operators of the nearby nuclear waste dump to the neighbouring communities. This could contribute to a negative position of the politicians towards an organic firm.

7.5.3 Organic raw material and regional sourcing

Eight excellence firms and four c+ firms are processing and selling 50 to 100% organic raw material. Thus, 12 firms from the sample can be called "organic producers". But in small percentages, more firms are involved in the organic products chain. Seven companies of 23 active companies report, that new skills are needed.

Source	compliance (5)	compliance + (18)	excellence (11)
Products from organic farming	0	9	10
Products from other env. friendly farming	0	3	3
Regional sourcing	2	13	9
Member of organic producers organisation	0	6	5

Tab. 7.52: Organic farming and regional sourcing

Regional sourcing is even more common. 24 of 34 companies in the sample do at least some regional sourcing. Main reason, as told in the interviews, is freshness. But some companies have arranged for “regional product marketing” as well. Nevertheless, under the 17 firms which achieved an export ranking of 50 or more, 11 are practicing regional sourcing and six do not. Regional sourcing is therefore not coupled to regional selling, but may as well be a special strengths on the international market.

Organic raw material (20): *Founding of the firm:* The founder is a very active young farmer of about 40 years of age, who originally ran a nearby farm. The farm started organic farming in 1988 (at that time he must have taken over from his father). In the following years after 1992 he started to market the vegetables for neighbours as well. Quite often, they faced an overflow of the market with their products. So e.g. huge amounts of cauliflower must have been ploughed due to a weak market in fall. They started to freeze such vegetables on a small scale and saw, that marketing of frozen products was much easier.

Both of their markets, the organic market as well as the frozen food market, kept growing. The decision of producing on a lager scale, was made. With investment help from the Land Schleswig-Holstein as well as from the European Union the new production building and machinery was installed and runs since summer 2000. The new plant would not have been built without that help.

His strategy is, to go 100% organic, for only the 100% seems to him to be trustworthy. He would as well prefer to sell to other members of the “100% group”, to present organic products as trustworthy as possible on the market.

Organic raw material (21): Starting Organic Production: Since 1988 the firm produces organic products in one factory, since 1994 in the other. Organic products were strongly demanded by industrial customers producing baby food. Without any co-operative team the new product was introduced in a management like style. A former production manager was in the year 2000 appointed as a special sales manager, since prospects for organic food are extremely good.

Help was provided by Bioland and GÄA, two big associations of organic farming. This was necessary to qualify the purchase and quality departments, which had to get accustomed to regulations for organic farming.

There were some problems concerning the supply side, especially to get hold of the right fruit and vegetables in time and in the right quality. The organic farmers had problems to get used to industry like customers.

Organic raw material (22): Selling to bulk consumers in canteens and restaurants: In the 1980s quality of organic food changed extremely and the date of delivery was not very much under control. Such, the sector could not gain access to bulk consumers. In the beginning of the 1990s, first projects in Germany were carried out which tried to market organic food also to bulk consumers. Together with a big organic farm/research centre in Hamburg and with the cities of Hamburg and Aarhus (Denmark) N participated in a project in the years between 1997 and 2001, which tries to develop this market. The project was initiated by the farm/research centre and funded by the European Union. It would, on a smaller scale, have been carried out without the grant as well. A problem is, that the EU only pays a small proportion of overall cost and requires a big lot of additional work for documenting, meetings etc. The companies must in the project also purchase new machinery (if needed) and cannot, which it would have done, buy used machines. The grant therefore turned out to be of doubtful value to the company.

Organic raw material (25): Natural Apple Orchards: For some decades the apples processed by KP have largely been produced in natural apple orchards. To prevent the apple farmers from changing to conventional cultivation techniques KP guarantees its suppliers a fixed price which is independent of the quantity and quality of the harvest. In this way KP combines the protection of a regional and traditional agricultural technique with the stabilisation of its most important raw material source and economic advantages for the farmers. No investments were necessary to implement the initiative.

7.5.4 Waste management

All of the firms interviewed separate waste.

Type of waste	Separate	Recycle	Total
organic waste	4	29	33
Paper and cardboard	1	28	29
PE-film	1	28	29
glass	3	19	22
tins and steel	1	17	18
Waste chemicals	2	2	4
Filter cake	3	10	13
household type waste	16	6	22
other	1	2	3

Tab. 7.53: Types of waste disposed of separately or recycled (FTF)

The main reasons for waste management are cost (18) and regulation (8). An economic impact is seen in lower price (probably because of savings in disposal cost) and therefore higher profit (see table 7.25). The image effect, which 11 of the firms mention, is a bit puzzling, because of the strong regulatory demands. Two companies of 17 more active companies report, that new skills are needed.

Waste separation (12): *Biogas:* They separate all streams of waste. In 1999 B decided to use their organic waste (1.800 tons p.a.) for the production of gas in a local gas production facility (Wanzleben Biogas). Together with WISA/Iden gas production was

tested and afterwards implemented in the Wanzleben Biogas production process. This waste recycling is cost neutral, transportation and dumping is organised by the gas-works. Because of their comparatively small waste quantity, an own production unit is too expensive. This initiative cost 2500 Euro for tests.

Waste separation (20): Biogas (under development): The first process oriented initiative to improve the new plant will probably be the biogas-processing of the waste (about 1500 t/a peel of vegetables) starting in 2002 or 2003. The idea came from the founder, who informed himself an fairs.

The plant will probably cost about 0,5 to 1 million EUR. The payback will be rather complex, for their will be revenue due to:

A. waste handling of 10.000 EUR per year,

B. waste water fees of 25.000 to 30.000 EUR,

C. savings of water of 30.000 EUR (in the more expensive cases),

D. heat and electricity supply.

They expect a payback time of about 10 years. Also this project will only be realised in the case of public funding.

Besides financial payback they expect some backup in marketing, since clean products should be produced in a clean factory and especially for the 100% organic sector one should choose this type of technology.

7.5.5 Energy

Companies report, that the initiatives reduce cost (8) with positive influence on prices (3), position in the market (3) and competitiveness (2). A positive influence on profit is reported by 7 companies. The investments are high, but not as high as for packaging or waste water treatment. Energy efficiency is cost driven. Only two companies of 23 active companies report, that new skills are needed.

		Investment		**relative savings**
Initiative		Cost (Euro)	Date	
Energy efficient heating system	8	6.000-100.000	Late 90`s	2 low, 2 medium, 4 high
Efficient heat management	2	1.500-15.000	mid 90`s	1 medium
Integrated heat and water management	12	2.500-2.500.000	90`s and earlier	6 medium, 5 high
Energy efficient lighting	4	500-40.000	Late 90`s	2 low,1 medium, 1 high
other	11	5.000- 1.000.000	90`s	1 low, 3 medium, 4 high

Tab. 7.54: Energy efficiency initiatives (FTF)

Energy saving (10): Improvement on the efficiency of the steam generator: Some time ago, the master fitter came up with an idea to increase the efficiency of the steam

generator. The master fitter has a reputation of being a very able and creative technician, so the proposal was implemented along with an engineering consultant and save on energy costs of 10% was realised, making the initiative a great success. A problem that had to be addressed was the need for short term liquidity, as the initiative was “in the range of several 10,000 Euro”. Typically, corporate culture remained unchanged. Mr R. was convinced that the master fitter would have and could have implemented the initiative without external help.

Energy saving (13): Berry freezing: In 2000 ELO had to build another freeze unit because of their strong growth of sales in frozen fruits and berries. Besides building an energy efficient plant, a counsellor from the Institute for Energie and Environment (BfE) suggested to improve the existing plant concerning the usage of energy. All things considered, ELO invested 200.000 Euro for the new unit and upgrading of the old one. Together with the workers BfE implemented the system, which wouldn`t have been possible without their advice. The initiative is scheduled to pay off in three years, which will certainly be achieved, as Mr. W. says.

*Energy saving (33): Installation of a combined heat power plant:*In 1999 a combined heat power plant was installed. This initiative was undertaken when the public energy supply was not longer able to satisfy the rising need of the company. Therefore the director had to decide between the alternative of installing a new connection to the electricity mains or building a combined heat power plant. At that time, he decided to build the combined heat power plant, because it seemed to cost less. But as the prices for oil are rising, maybe he would install a new connection to the electricity mains today.

7.5.6 Packaging

Packaging is central to the presentation of food products if sold to consumers or retailers. It is focussed on quality, if products are sold to other producers. Packaging machinery is the most expensive of all initiatives. 19 companies reported investments. Of these, on average 770.000 Euro are invested if a new plant is bought. The environmental impact is coupled to the type of packaging used. returnable packaging as well as polyethylene film are often seen as more positive. But LCAs in this sector are heavily political and sometimes subject to change in weightings.

returnable packaging	24
one way packaging	15
Polyethylene film	15
Tetra bricks	2
Tins	1
Other	4

Tab. 7.55: Methods of packaging used by firms (FTF)

No real “initiatives of change” could be identified which were driven by environmental reasons. In most sub-sectors, market reasons dominate and the choice of packaging is not within reach of environmental concerns. No company reported that new skills were needed.

Packaging: (26) Reuse of bottles: Wine estate VK has traditionally been running a take back and reuse system of wine bottles. There are no economic advantages connected with this system as compared with a one way system - the costs are the same.

7.5.7 Avoiding artificial ingredients

Nearly all companies avoid nearly all artificial ingredients in our questionnaire. Only preservatives are used in 10 companies. The result is due to the sub-sector “fruit and vegetables”. It does actually not make any sense to pop up beans or carrots with aromas or colours. In juices, the use of these substances is prohibited by law.

Three companies report, that new skills are needed.

Artficial colours	31
Preservatives	24
Genetically modified organisms or substances which are produced by genetic technology	32
Artficial aromas or flavours	29
Taste intensifying substances	29

Tab. 7.56: Avoiding artificial ingredients (FTF)

Overall, careful thinking would have prevented us from asking the question at all.

7.5.8 Water protection

Since most processes use a lot of water for cleaning of fruit, vegetables or bottles, most firms are active in water saving and protection. Water saving technologies are in most cases profitable while treatment plants are not. Average investment was high: 495.000 Euro.

Eight companies of 32 active companies report, that new skills are needed.

Technology	No. of Firms	% of answers	Running costs	
			Up	Down
Water treatment plant	11	32,4	5	2
Water saving production technology	19	55,9	2	14
other	13	38,2	1	8

Tab. 7.57: Water protection and efficiency initiatives (FTF)

Water protection (05): Sewage treament: In 1980, the district and county authorities demanded from B to implement a sewage treatment plant. The reason behind this was very obvious bad smelling effluents in nearby streamlets and trenches. Mr B senior ordered a plant from engineering consultants who showed good performance and successfully implemented the plant for 10% of the investment costs, i.e. 23,000 Euro of 230,000 Euro total investment. No workers from B were included in the implementation

and firm culture did not change at all. Some time after the successful implementation it turned out that the effluents were from neighbouring farmers and the smell originated from milk loads turned sour. At the moment, local authorities are negotiating with B to give up their own treatment plant and connect B to the communal sewers.

Water protection (14): wastewater treatment plant: When the company was set up in 1989, authorities demanded a wastewater treatment plant to be built, which cost several million Euro. It was implemented by the management and some workers. Engineering consultants provided good planning services. The plant was for the most part built by the supplier of machinery and a local construction firm. Corporate culture obviously remained unchanged. External help was indispensable. After the initial implementation, further up-grades were necessary from time to time. These cost approximately 500,000 Euro until now. In addition, a cleaning in place (CIP) system was implemented. It cost 50,000 Euro in 1999 and saves substantial amounts of money.

Water saving (11): Bottle cleaning: In 1995 H had to replace their bottle-cleaning unit. They chose a technical solution that uses less water than an unmodified cleaning unit. The water saving system was manufactured and implemented through SEITZ, Leimen for 5.000 Euro and leads to good water and cost saving results (about 20% compared with the old system). H estimates the payback period with 4 years facing a lifespan of 20 years.

Water saving and protection (21): wastewater treatment plant: In the year 2000 one of their plants built a waste water treatment plant which is capable to clean the used water to such an extent, that it may be used again. The motivation came from environmental regulation. The idea came from visiting a fair. It was put in practice without a team but with considerable help by the supplier.

The plant did cost 4M EUR and it is necessary to employ an additional person to run it.

Water use is expected to reduce from 160.000 m3 to 32.000 m3 a year. Water cost would therefore go down by about 350.000 EUR. The plant will be slightly profitable. It is expected to have a moderate influence on the company's image.

Water saving (22): Water free peeling: The main environmental burden from peeling is waste water contaminated with organic substances, which use up a lot of oxygen in the water. Already in the start up phase of the business, an inventor of a water free type of peeling machinery made himself known to the founder. The first machine was developed and tested with funding of the European Union. People involved were the founder, the supplier DORNOW and the workers handling the machine. There were no important problems and no influence on the companies culture. The initiative would not have been carried out without the grant of the EU.

The current machine, installed after the burn down in 1998, cost 425.000 EUR, the additional cost for the no-water type being about 50.000 EUR. Since the machine saves 5.000 m^3 water a year (costing 3 EUR per m^3) the initiative is highly profitable. In addition, the only issue of environmental regulation which could be applied on the company would have been water pollution, which is avoided by the technology. Such, the contact to the regulating body becomes extremely easy.

8 Cross Sector Findings

Most cross-sector as well as international analysis will be presented in the central, international report of this project. However, some aspects are of special interest and are documented here.

8.1 The Output-Hypothesises

First of all, it is of interest, which types of initiatives are carried out throughout the three sectors and which economic impact is connected to them. The highly regulated waste separation is common, but efficiency oriented process initiatives as well as product related measures are less so. Environmental management and communication in all three sectors rank last[26].

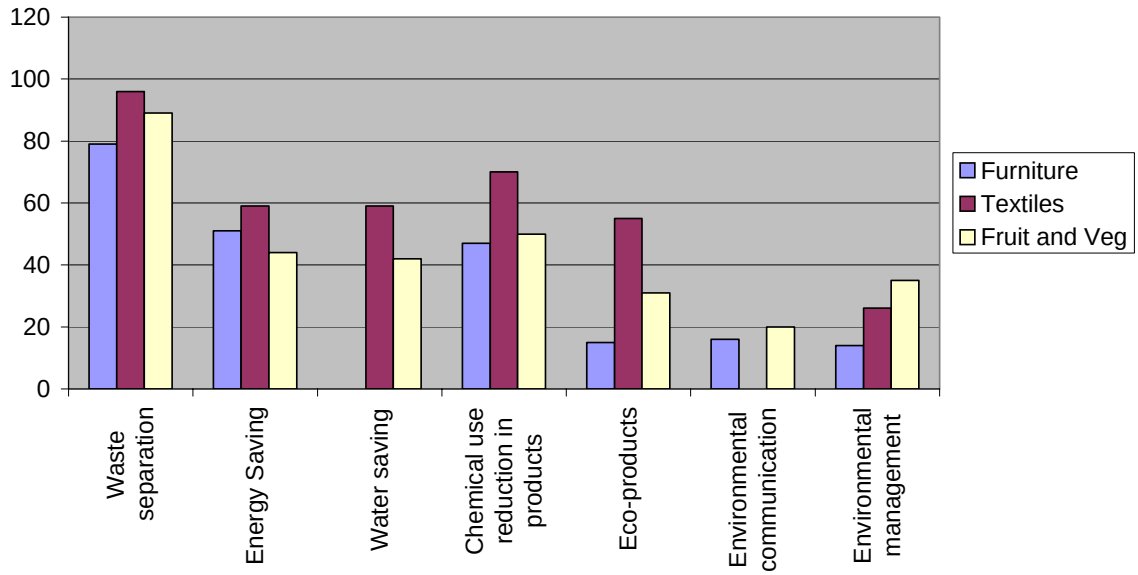


Fig. 8.1: Initiatives in the sectors (PQ, %)

A bit different is the picture from the FTF interviews. In the FTF-firms product as well as process related initiatives are quite common. Just management and communication are practised in only 25% of the firms. The low level of “waste separators” in fruit and vegetable processing is a result of only weighting four or more separated waste streams as real waste separation.

[26] Water saving if of no importance in furniture manufacturing (and was not asked for) and communication was not asked for in a comparable manner in textile finishing.

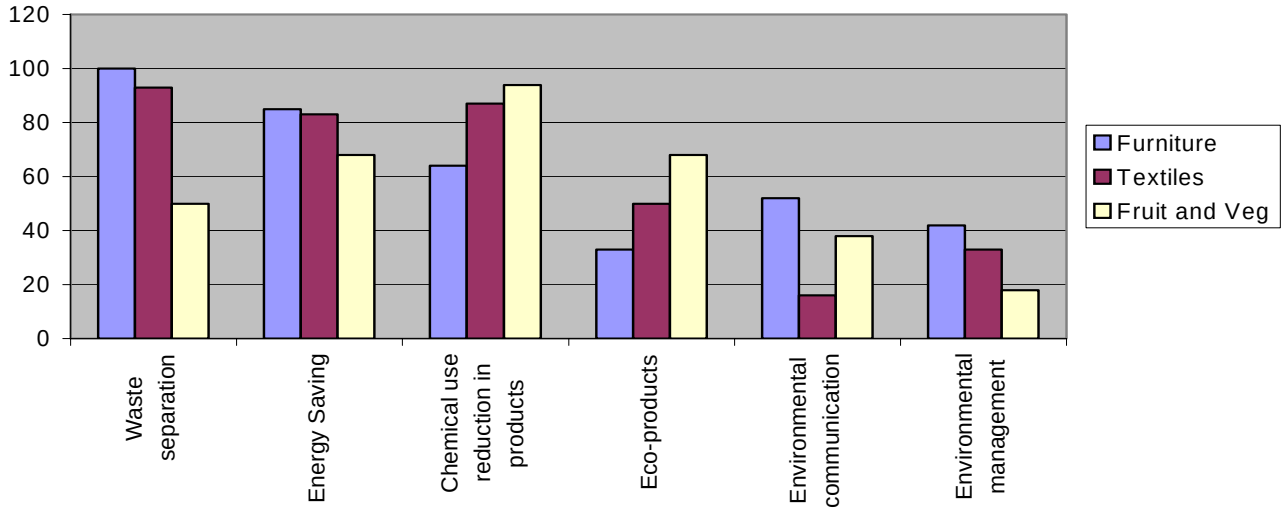


Fig. 8.2: Initiatives in the sectors (FTF, %)

Generally, the initiatives may be split up into three main drivers-groups: market, cost and regulation driven initiatives. In most cases, more than one driver is important, but the rough grouping may lead us to some insight as well. The following three figures sum up all economic results given by the FTF-firms concerning the initiatives. They are presented in %, which means, that a 40% column would indicate, that in 40% of the initiatives mentioned a specific output would be mentioned in connection with it.

The first group would encompass 269 market related initiatives[27] of the FTF-firms (data source are tables 5.5, 5.6, 6.24, 6.25, 7.24, 7.25 in the respective chapters):

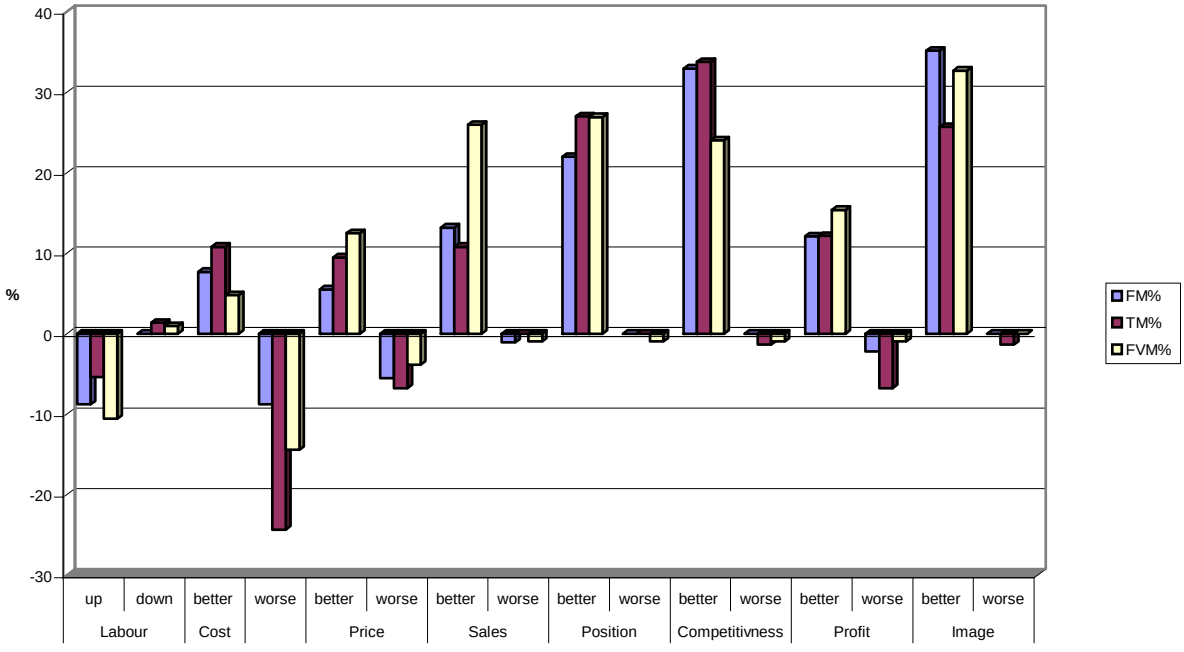


Fig. 8.3: Market related initiatives in the sectors (FTF, % of initiatives undertaken)

[27] Market related initiatives: Environmental management and communications, ecological and organic raw material initiatives, labelling, avoiding of toxic or artificial ingredients, packaging.

The second group encompasses178 cost related initiatives[28] of the FTF-firms (data source are tables 5.5, 5.6, 6.24, 6.25, 7.24, 7.25 in the respective chapters):

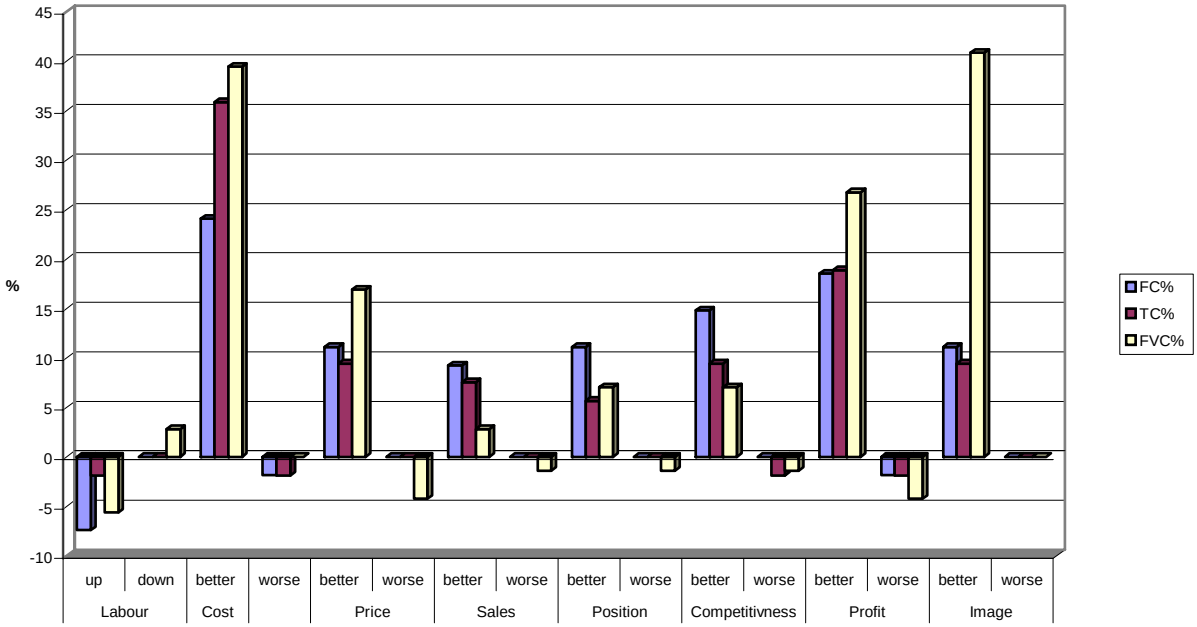


Fig. 8.4: Cost related initiatives in the sectors (FTF, % of initiatives undertaken)

Finally, the third group encompasses 72 regulation driven initiatives[29] of the FTF-firms (data source are tables 5.5, 5.6, 6.24, 6.25, 7.24, 7.25 in the respective chapters, fruit and vegetable firms did not claim *any mainly* regulation driven initiatives):

[28] Cost related initiatives: Water and energy saving, waste separation and (in the furniture sector only) packaging.

[29] Regulation driven initiatives: Water protection, air protection and (in the furniture sector only) waste separation.

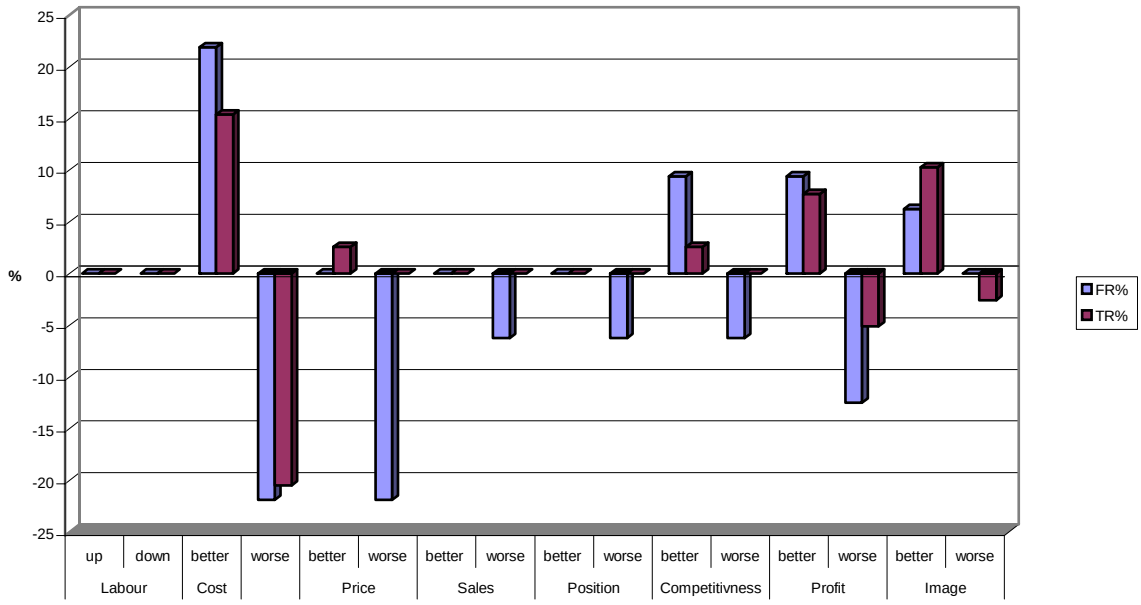


Fig. 8.5: Regulation driven initiatives in the sectors (FTF, % of initiatives undertaken)

It is impressive to see, that the output-characteristic of these groups of initiatives is totally different. Market related initiatives lead throughout the sectors in about 25-35% of the cases to a better position in the market, competitiveness and image. They foster sales and profit in 10-15% of the cases. But investments in labour and higher operating cost must be made (10-20% of the cases). Such, these initiatives are the result of entrepreneurial behaviour: Money and labour are invested to get access to more sales or better prices.

Cost related initiatives show that cost savings (20-40%) lead to better profits (20-25%). The image fostering mentioned by the fruit and vegetable firms may have to do with industrial customers, which see efficient production as a positive image factor or may as well be put on the BSE-crises. In general, a comparatively simple cost down – profit up relationship can be shown.

Regulation driven initiatives do obviously not account for much economic advantages. A negative impact on cost is more often than a positive, worse (higher) prices on the market may lead to worse sales in some cases. In a few cases, higher profit reflects the lower cost and a slight image effect shows the risks of non-compliance. But in contrary to cost and market driven initiatives, which only have positive market effects, regulative driven initiatives lead to market effects in positive as well as negative directions.

Looking on the economic impact of all the 1342 PQ initiatives a pronounced effect of environmental initiatives can be supported. In contrary to the detailed answers of the FTF-firms, only rough information is available. It is striking, that there are no real differences between sectors. The managers answering in this samples were very much more in favour of saying, that the initiatives need a high labour (30%) and money input. While in all three sectors 40% of the initiatives were considered to be cost neutral, 20-35% paied and 30-40% were costly. Productivity was nearly not affected. Sales were a bit higher and the effect on profits shows, that higher cost of some initiatives must have been compensated by higher sales. Overall, at least some of the labour and cost input can be compensated by the market and is not totally a burden on profit.

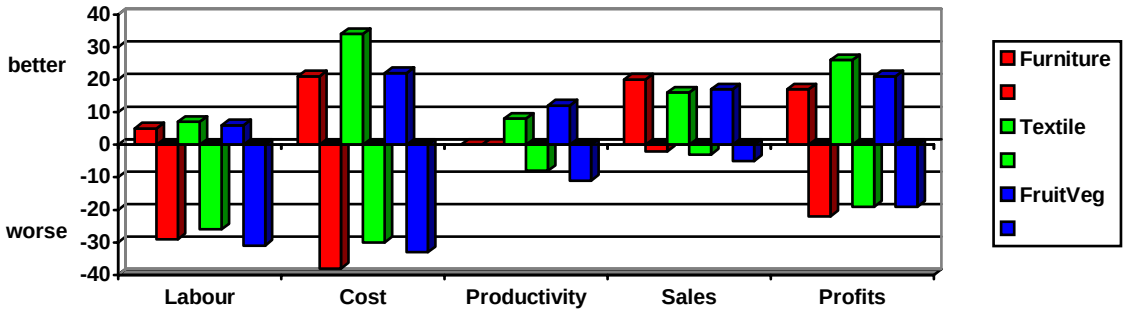


Fig. 8.6: Economic output of initiatives in all sectors (PQ, % of initiatives undertaken)

Issues relating to the output hypothesis – which, to put it in a nutshell, proposes that economically successful firms will be more environmentally active and probably create more jobs – can not fully be discussed as a reliable measure of environmental performance across industries is not yet available. Moreover, the economic indicators of the three environmental performance groups do not point all in one direction. It cant be stated, that the environmental conscious firms are generally economically more successful. But in all sectors, they show slightly higher qualification and more R&D, newer machinery, higher growth expectations and in two sector higher profits (fruit and vegetable processing excluded). In two sectors they have higher exports as well (fruit and vegetable processing excluded). After all: the good environmental performers might be economically more successful, but it is clear, that they are not significally falling back.

8.2 The Input-Hypothesises

The subject of our research being small and medium enterprises, it is hardly surprising that only 5% of all companies in the sample follow a cost-leadership strategy as this particular strategy usually requires some degree of economies of scale. However, a considerable number of fruit and vegetable processing companies follow this type of strategy (12%). By far the strategy most commonly found was a focussed strategy (58%), i.e. either a very specific product is being sold, or a less specific product is sold to a specific segment of customers. SME in the furniture industry specialised in office furniture, living-room furniture or customised furniture but most often they did not have a deliberate regional focus. This again was a tendency of fruit and vegetable processing companies. Here, regional sourcing and selling often went hand-in-hand. German textile finishers, on the other hand, often feel that they can not offer cheaper, but quicker and more reliable service than foreign competitors. As a consequence, differentiation strategies are comparatively very common in this industry, being almost as frequently as focussed strategies (47% vs. 50% focussed).

Groups	Cost Leadership	Differentiation	Focussed	Total
Furniture	0 (0%)	10 (31%)	22 (69%)	32
Textiles	1 (3%)	14 (47%)	15 (50%)	30
Fruit&Veg.	4 (12%)	11 (32%)	19 (56%)	34
TOT	5 (5 %)	35 (37%)	56 (58%)	96

Tab. 8.1: Market Strategies

The textile finishing industry is however very much in line with the national trend as far as the environmental strategy is concerned. Most companies comply with regulation or try to discover potential eco-efficiency measures in their processes (30% and 33%, respectively). In comparison, strategies to develop a positive environmental profile in the market are scarcest in the market, developing new markets was not implemented by any of the companies interviewed face-to-face. In summary, the textile finishing industry appeared as the most passive industry in the survey on environmental issues. This may however be to some extent caused by the industry's position far down the supply chain. The fruit and vegetable processing industry, being interviewed in the context of a lot of coverage on BSE in the media, appears as a relatively active industry. Here, improving brand image by eco products is the single most common environmental strategy (29%), even if compliance with regulations and cost reductions are still very important. Developing new markets was not an important issue in any of the industries.

Main focus	**Furniture %**		**Textile Finishing %**		**Fruit&Veg. Processing, %**		**Average %**	
	PQ	FTF	PQ	FTF	PQ	FTF	PQ	FTF
Complying with regulations	31,3	39	58.9*	30	22.9	21	37,7	30,0
Reducing costs	27,3	31	52.1*	33	22.9	27	34,1	30,3
Improving brand image by eco products	18.0	23	28.8*	13	24.0	29	23,6	21,7
Improving brand image by eco practices	16,7	8	20.5*	20	14.9	6	17,4	11,3
Developing new markets	6,7	0	12.3*	0	8.0	6	9,0	2
Not a relevant issue	n.a.	n.a.	6.8*	3	7.3	12	7,1	7,5
3+4 Improving brand image by adressing env. issues	34,7	31	48,3*	33	38,9	35	40,6	33

** only in this sample it was possible to give more than one answer*

Tab. 8.2: Environmental Strategy

On a slightly higher level of abstraction, again a remarkable continuity becomes visible: adding up improvement of brand image by eco products and practices, a subgroup with a steady share of companies between 31% and 35% for the FTF-samples and 34,7% to 48,3% in the PQ-samples. This steady third probably represents the core of companies with managers who will pursue an active approach on environmental issues. Yet again, these managers will focus on the issues relevant at the time being for their industry. In the furniture and fruit and vegetable processing industries, products leave the company very much in the same condition as they will be consumed. In textile finishing, on the other hand, the product only becomes ready to market a further step down the supply chain. The product is at that level a product for industrial buyers, but not for consumers. This might be a good reason why processes are gradually more important – processes are a complicated matter for consumers and they will not be contemplated in a purchase context unless they are on the current or at least recent media agenda. Industrial buyers, on the other hand, (as employees of an organisation) have specific knowledge to evaluate processes and they are being paid for having time to assess complicated issues in a buying context.

Companies' reasons for adopting environmental issues have also been explored by other survey items. Asked for the most influential factor in the identification of initiatives, respondents from the furniture and textile finishing industries shared the impression that in

most cases regulations were the starting point (39.3% and 46.7% respectively). In the fruit and vegetable processing industry, regulation was not perceived to be very important. Here, management awareness (32.2%) and customer demands (33.3%) were of predominant importance.

Factor	Furniture		Textiles		Fruit&Veg	
	PQ	FTF	PQ	FTF	PQ	FTF
Regulations	39.3	13	46.7	41	19.6	15
Management awareness	31.0	66	19.4	35	32.2	73
Customer demands	29.7	13	22.6	21	33.3	9
Cost	n.a	n.a.	11.3	n.a.	14.9	n.a.
Other reasons	n.a.	9	n.a.	3	n.a.	3

Tab. 8.3: Most Influential Factor (%)

While the results of the FTF-interviews in the textile finishing industry are closely in line with the PQ results, the figures for the furniture and fruit and vegetable processing industries deviate to a considerable extent. In these industries, most interviewees stated that they, as the wording went, “adopted environmental initiatives because they wanted to contribute to a clean environment” (66% and 73% respectively). The difference is also significant in the textile finishing industry, but not as pronounced (35%). So, first of all, this result supports the notion that SME in textile finishing are more regulation driven than in the other two industries.

The general trend towards less passive stated behaviour in the FTF-samples can however be explained by two compatible hypothesises:

1. More active companies were keener on giving interviews.
2. Interviewees were inclined to give the socially more acceptable impression that they were doing what they thought was the right thing instead of something that they were forced to do.

The same remarkable difference between FTF and PQ samples again becomes apparent in respondents general judgement on whether “people worry too much about the environment.” The standard variation between industries is 7.49 for partial disagreement in the PQ-samples and 6.5 for full disagreement in the FTF-samples. Across all samples, the standard deviation for partial agreement is 17.85 and for full disagreement it is 18.9. Clearly, the PQ and FTF-samples differ more from each other than PQ from PQ and FTF from FTF samples differ.

Anyway, respondents from the fruit and vegetable processing industry were significantly less inclined to agree with the statement. But again, in this specific industry the issue was industry-specific on the media agenda at the time the survey was made.

Main focus	Furniture %		Textile Finishing %		Fruit&Veg. Processing, %		Average	
	PQ	FTF	PQ	FTF	PQ	FTF	PQ	FTF
Full agreement	3.3	7	6.9	15	10.5	15	6.9	12.3
Partial agreement	64.8	27	63.9	30	51.4	29	60.0	28.7
Partial disagreement	24.2	17	19.4	19	17.1	11	20.2	15.7
Full disagreement	7.7	50	9.8	37	21.0	44	12.8	43.7

Tab. 8.4: Degree of Agreement with the Statement „People Worry too Much about whether Economic Development Damages the Environment“

Another question asked for the main effect of environmental legislation. This produced more industry-specific results. While in the furniture industry there was a draw between respondents stating that environmental legislation reduced competitiveness (47.8%) and that it improved environmental quality. In the textile finishing industry on the other hand, most respondents agreed on the notion that legislation was mainly a blow on competitiveness (62.1%). Finally, in the fruit and vegetable processing industry increased efficiency in the use of resources becomes very important for respondents (32.9%), while this aspect had been virtually negligible for the other two groups of respondents (2.2% and 12.1% respectively). Still the largest group focuses on the negative influence on competitiveness (36.3%), but in fact most respondents (63.7%) saw the positive side of the regulations, either because it (mainly) improved environmental quality (30.8%) or increased efficiency of resource use.

Effect	Furniture	Textiles	Fruit&Veg
Reduced competitiveness	47.8	62.1	36.3
Improved environmental quality	50.0	25.8	30.8
More efficient use of resources	2.2	12.1	32.9

Tab. 8.5: Main Effect of Environmental Legislation (PQ, %)

Apart from reasons for the implementation of environmental initiatives, we also examined factors that prevent companies from these activities. The single most important reason the interviewees reported was difficulties in making capital available for these projects. This is only important for the capital intensive initiatives, but it may not be as trivial as it seems. A number of financing schemes exist, but many SME may not have the resources to make these funds available. The banking system, for their part, are notoriously cautious with loans for SMEs. It would quite certainly be an important step in the promotion of capital intensive environmental initiatives in Germany if the availability of capital was improved – either through funding schemes adequate to SME's capabilities or a less bureaucratic approach of banks in granting loans.

	the 3 most important problems									Sum.
	Furniture			Textiles			Fruit&Veg.			(N=99)
	1.	2.	3.	1.	2.	3.	1.	2.	3.	
It is hard to find the capital for investment	17	2		12	4	3	16	2	0	56
The regulations are too uncertain to plan for new technology	2	7	7	3	4	3	2	2	5	35
Clean technology investments do not show an adequate return (payback period is too long)	1	5	2	7	5		3	8	1	32
Clean technology is still risky and unproven	4	5	2	2	3	2	3	2	3	26
We do not have the right skills and expertise in-house (e.g. R&D)		2	5	2	1	2	4	3	1	20
Regulation does not support initiatives					2	6	0	1	4	13*
Environmental consultancy services cost too much		1			3	1	0	2	2	9
Middle management lacks environmental commitment		2	3			1	1	1	1	9
Management does not have enough time	2	2	1				0	4	0	9
Making a profit is more important than env. protection						3	1	3	0	7*
It is hard to get good advice		1	1		2		0	0	1	5
Suppliers do not provide any help in adopting environmental initiatives	1						0	1	0	2
Lacking R&D capacity	3	1	1							5**
Risk of success			5							5**
Top-Management lacks environmental commitment	1		2							3**
Availability of good technology		2	1							3**
Others				1	1		2	0	2	6*

Tab. 8.6: Most important problems associated with environmental initiatives (FTF)

Other issues that were very much relevant for all industries were uncertainty on the part of environmental technologies but also with respect to (new / changed) regulations. Espe-

cially in the textile finishing and fruit and vegetable processing industries many respondents stated the opinion that the payback period of clean technologies was too long. The lack of in-house expertise was seen as relevant but it is obviously not exactly a pressing matter. This analysis is further supported by the issue, if addressed, was mostly mentioned as a second or third reason. Finally, especially in the textile finishing industry a number of interviewees stated the opinion that regulation did not support initiatives.

9 Conclusions and policy recommendations

The project had the final aim of proposing policies for the environmental activity of the European Union. From the project results, multiple ideas of policies to foster environmental as well as business performance of SMEs in the three segments arose. To ensure an overall coherence of the policy proposals, we decided to use the concept of an Integrated Product Policy as a framework for the proposals developed by the German team. The concept is very suitable because it is focussing:

- on production as well as on product related environmental protection,
- on environmental as well as on market success of companies.

The following section gives some information on the IPP concept and lists central results arising from a special evaluation of the project findings in the light of IPP and the policy recommendations for each of the three sectors. Very helpful was a special funding of the German Bundesland Northrhine-Westfalia, which enabled us to follow the IPP idea with special effort (Clausen, Jens; Rubik, Frieder 2001). The outline of this research is also given in chapter 9.1.

9.1 Integrated Product Policy

Since the beginning of the year 2000, Integrated Product Policy (IPP) is a subject of concrete political initiatives on the levels of EU, the member states and the regions in the states. In Germany, the German Industry Association (BDI) and the German Chamber of Commerce (DIHT) criticised the initiative, but on the other hand also support it. critique focuses mainly on “additional burdens” and “impact on competitiveness” of firms. But industry is principally open: the BDI also proposes pilot projects.

The development of the first papers concerning an Integrated Product Policy and a first workshop performed by the EU Commission on December 8th 1998 have caused a lot of discussion and support as well as critique within the industrial and business community also on the EU-level. According to the results of the workshop, the commission has to explain the value added of IPP in more detail (europe.eu.int/comm/environment/IPP/home.htm). This obviously includes the obligation to explain the environmental benefits as well as the economic benefits (or at least the absence of additional burdens) resulting from the concept. These benefits may exist, but their existence is, until now, not clear to business. Some of the most important arguments of business concerning IPP are:

- IPP should (beside environmental concerns) include economic as well as social components. A proper cost-benefit analysis is necessary. International trade rules have often been violated by environmental regulation, which must be avoided in the case of IPP (EU-Committee of the American Chamber of Commerce, December 10th, 1999).
- IPP might cause a contra productive shift of burdens between market participants and thus lead to inefficiencies, which should be avoided (BDI Germany answering questions from the CDU in a parliament hearing on IPP, April 15th 1999).
- IPP should only be put into practice if unnecessary burdens to firms can be avoided. Discrimination of products must be avoided. Free trade and competitiveness might be negatively affected by IPP, which must also be avoided (DIHT Germany answering questions from the CDU in a parliament hearing on IPP, April 13th 1999).

One result of the Workshop on December 8th 1998 is also, that the commission should identify best practises developed in member states and determine underlying success factors (workshop protocol available on the mentioned web site). A scientific project prov-

ing that environmental initiatives, which are or could be part of IPP, can lead to economic benefits for the firm, would certainly be of high value.

Within the project “The relationship between competitiveness, environmental performance and management of small and medium sized European manufacturing firms (SMEs)“ some results show, that this can be the case. An example may be drawn from the German textile finishing sector. The economic impact of certain initiatives, mainly driven be regulation, cost or market, were analysed. Only very small positive or negative economic impacts can be related to the two mainly regulation driven initiatives. A very simple cost down, profit up relationship is connected with the two cost driven initiatives.

The impact of the market driven initiatives is much more intensive and complex. More firms feel, that there is an impact at all (15 out of 33 in the case of better competitiveness because of co-operation and communication). But more labour and higher cost on the one hand lead to different (higher or lower) prices, better sales, much better position in the market, competitiveness and image. Profit may also be better, if the initiative is turned into an overall success by the firm. The project shows, that real entrepreneurship is necessary to turn these measures into a success.

From these results, some new hypothesis have been developed:

A. Companies may improve their competitiveness by market-related, communication-intensive environmental initiatives.

B. The complexity of the impact of this kind of initiatives is much higher than eco-efficiency measures.

C. Elements of IPP already put in practice support the competitiveness of those companies, which actively make use of them.

D. Enforcing IPP by a complete set of components improves especially the competitiveness of environmentally active companies.

The initiatives included in the questionnaires were positioned in relation to IPP. All questions were analysed according to their importance to answer the hypothesises A to D. A method to group companies in IPP performance groups was developed. The statistical analysis was done a second time on the basis of the new groups and all interesting correlations were analysed. We formed three groups:

- “IPP-beginners” are firms which only show rudimental effort towards sustainable products,
- “IPP-intermediate” firms have made considerable progress and
- “IPP-practising” firms have implemented a lot of initiatives, which enable them to react proactive on a possible IPP.

The set of policy recommendations was developed according to the “seven building blocks of an integrated product policy”, which was developed within a consultation project for the German Environmental Ministry.

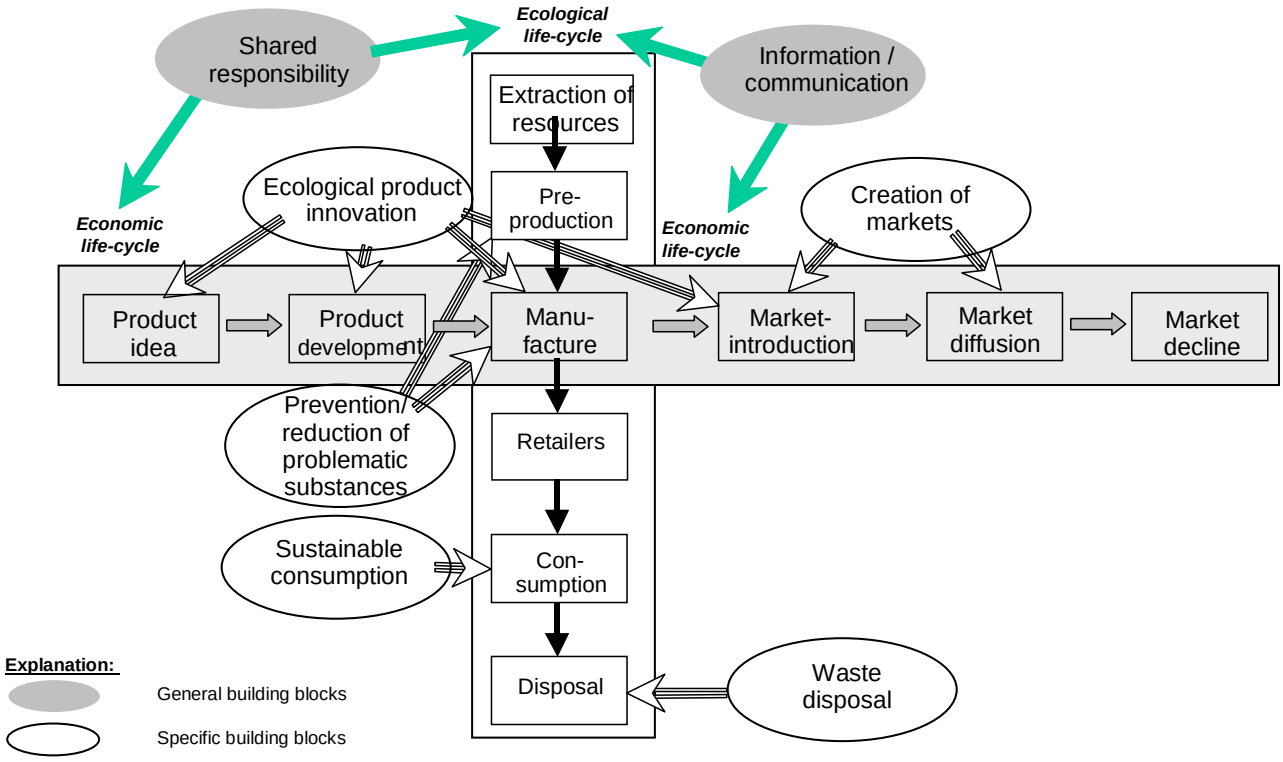


Fig. 9.1: The seven building blocks of IPP

The figure shows, that IPP is concerned about the environmental impact in the life cycle of products including their production as well as their economical life cycle. It is therefore extremely useful to guide the search of policy initiatives which have to be environmentally effective as well as economically viable for the firms.

9.2 Summary and IPP- policy advice for furniture industry

A couple of empirical results seem to be important. E.g. the R&D capacities are concentrated in firms which already undertake a lot of product related IPP-initiatives. In the group of the beginners the R&D capacities are low. Both, the implementation of ecodesign and – less intensive - of EMS increase the number of product related environmental issues, which are observed by the firms. But not all firms, which realise aspects of environmental product development, make use of them for marketing.

Through the introduction of ecodesign-concepts external communication about environmental issues and responsibility for products is sometimes improved. Ecodesign therefore seems to be more prone to foster market related success than an EMS, which is often run completely internal and often does not alter market communication. Most EMS are found in larger firms (more than 150 employees) and an EMS would most certainly be of no use to influence product related environmental aspects in smaller companies.

Some aspects within the ecodesign-concepts should be valued more in future (lightweight construction, certified wood) whereas some others already are realised in many companies (long-living furniture, solid wood furniture). Figure 9.2 gives an overview over the importance of single ecodesign issues.

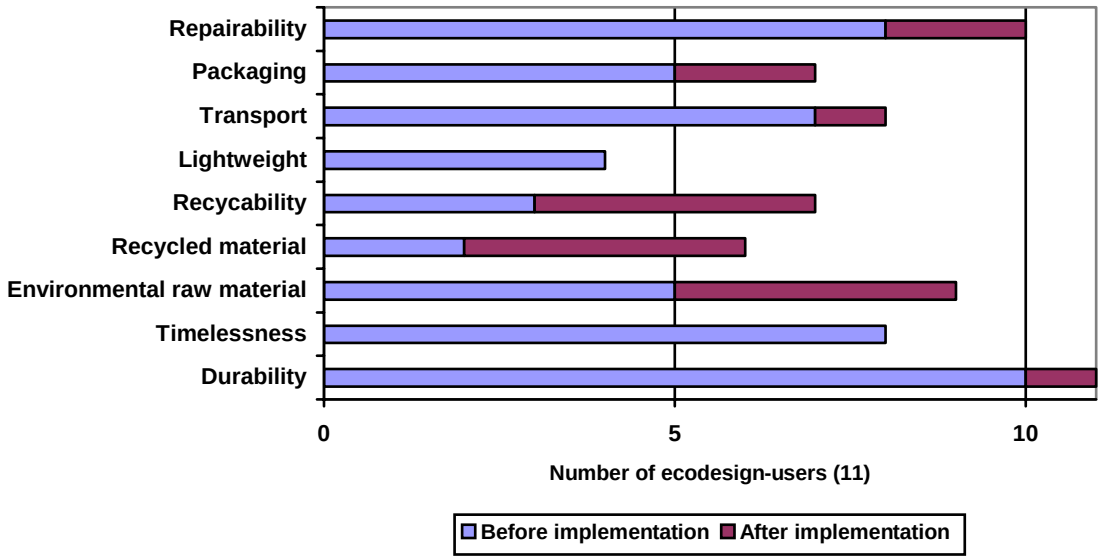


Fig. 9.2: Issues reflected in design before and after implementation of an ecodesign scheme

In the opinion of some manufacturers of furniture for private households retail is a major obstacle. Big retailers try to avoid too much information about environmental aspects, which might prevent consumers from buying cheap imports with good profit margins. In the office furniture segment, marketing of environmental optimised furniture is much more common and there is no similarly relevant retail branch, but much turnover is generated directly between producer and final client.

Firms, which are putting IPP-ideas into practice, have more qualified employees and newer machines. They have a higher export rate than the beginners and they could hold their number of employees during the last five years whereas the beginners show an average decline of 38,5%. With regard to profit, IPP-practising firms are performing similar to other groups. Consequently, they can be regarded as economically more successful.

The interviewees of the IPP-practising firms have a more environmental attitude than the interviewees from the other groups.

Looking at these empirical results and some findings from the IÖW-project " Innovation in environmental policy – Integrated Product Policy in Germany"[30], two main points concerning an IPP in the furniture sector can be stressed from the view of the manufacturers:

[30] see Rubik 2000 and Hoffmann et.al. 2000

9.2.1 Influencing furniture retail trade

The furniture retailers directly selling to private households quite effectively prevent manufacturers from selling environmental optimised products[31]. Beside the “Blauer Engel” which concentrates on emission related aspects of healthy living, the industry uses the quality mark “Gesundes Wohnen (healthy living)” of the Deutschen Gütegemeinschaft Möbel (German Quality Association for Furniture DGM). The quality and check regulations of the DGM contain the following criteria with respect to the environment/ healthy living:

- Emissions of formaldehyde and volatile organic compounds (VOC),
- Odour emissions when the furniture is new,
- Content of biozydes (pentachlorinephenole, lindan, pyrethriode, other biozydes),
- Content of azo-colours, as far as it is included in the “Bedarfsgegenständeverordnung Anlage 1 Nr. 7” (Regulation for production of products for daily use). This is only applicable for parts of furniture, which get in contact with human skin,
- Using CFS according to CFS interdiction decree in the production,
- Content of flame proofing agent in polyurethane-foam and
- Content of chrome VI in leather as well as a range of heavy metal concentrations in furniture for children.

In addition to these demands for materials selection, consumption of resources (including energy) as well as environmental effects of the production, packaging, transport, use and waste management should be paid attention to. But there are no clear and verifiable requirements in the quality regulations. It is easy to recognise that the standards of the quality seal of the DGM only seriously control “avoidance of harmful substances”. For that reason, it is comparable with environmental labels such as the Ökotex 100 label for textiles, which are characteristically more suitable for healthcare than for environmental protection.

The contents of ecodesign-concepts which are shown in figure 9.2 go further than the requirements of the “Blauer Engel” as well as the DGM-seal. To improve the transparency of the furniture retail from the perspective of the consumers and to make possible a recognisable and clearly differentiated presentation of environmental friendly furniture, a considerable progress in furniture trade will be necessary. The retailers therefore are important partners for an IPP-project which depends on co-operation. They are as well an important actor for the implementation of IPP-initiatives. Furthermore, activity of the manufacturers can only be expected if high value marketing is possible at all.

9.2.2 Environmental conscious products

A range of positive environmental aspects is traditionally included in many furniture products. In the past, durable furniture was a goal of many manufacturers and this issue is still very important for many producers today[32].Repairability and a timeless design are also in many cases an aim of design. In the development of environmental conscious products, the furniture industry has achieved additional goals in the 90ies. In this time, some emission problems, e.g. formaldehyde, have almost been solved.

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[31] For the German market, an intensive critics came from furniture manufacturers concerning the hard opposition of most retailers against labels or other visual marking of environmental conscious furniture.

[32] The furniture manufacturers association mentioned, that the medium quality market segment (formerly about 50%) is shrinking dramatically. This turnover is divided presently into the high value and the cheap segment. Durable medium quality might therefore be a shrinking segment. (Focus group HDH 2000)

Nevertheless, with regard to the development of furniture for the sustainable society, there remains much to be done:

- recyclability, take back and rework can be improved,
- environmentally improved and innovative raw materials should be used,
- higher efficiency of material use could be achieved by lightweight construction,
- the ability to be transformed and the possibility to change appearance/ design would be necessary to realise durable furniture even as fashion and tastes change in the course of time.

Such goals can only be realised by furniture firms, which are by themselves able to change their product programme. In this respect, the weakness of R&D of small firms is obvious. The low level of equity capital also doesn't make it easy for firms to invest in R&D.

Via the implementation of EMS, the spreading of ecological design may be promoted in larger firms (more than 100 employees).

The interconnectedness between possible IPP-measures and the aim of improving competitiveness of the firms is the following:

1. A major part of measures focuses on the components "sustainable consumption" and "creation of markets". Success in the implementation of related measures would directly lead to advantages for firms, which have invested in environmental conscious products, marketing and environmental management. These firms would have the chance to improve their market position.
2. "IPP-beginners" and "IPP-intermediate" firms would be supported by measures in the components "information/ communication" as well as "product innovation". They could thus gain market access to the newly developed markets.

Development of sustainable consumption and markets would first lead to advantages for the advanced firms, but later on innovation would spread out in the sector. The focus of activities would always be market related measures improving competition.

9.2.3 Possible initiatives

Two types of initiatives will be presented: measures which are strictly connected to single IPP-building blocks and other measures, which relate to a number of building blocks.

9.2.3.1 Multiple building block initiatives

- ***Furniture as a pilot project for IPP:*** IPP is still a vague concept. This concept should be made more concrete by pilot projects in different nations and sectors. Furniture would be a possible sector. Business associations as well as manufacturing firms, retailers and suppliers could thus participate in a policy developing process.

9.2.3.2 Initiatives in the seven building blocks

Building Block "Sharing of tasks"

- ***Co-operation with advisors and informational sources:*** Advisors and informational sources (see chapter 5.4.3) in the sector should be integrated in any IPP activity.
- ***Communication of responsible product management:*** Production, retail, use and disposal of furniture is the shared responsibility of different actors in the furniture chain. Each of these actors has certain possibilities for action, which should be agreed

on and communicated within the sector.

- ***Benchmarking of good practises:*** A lot of practises in responsible product management is in existence, but not sufficiently well known throughout the respective industry. Excellent practises and measures should therefore be collected and communicated in intervals in a kind of "benchmarking-report".

- ***Co-operation:*** Innovation is often said to mushroom from co-operation[33]. Very often, only the exchange of information and practises as well as co-operational problem solving lead to innovation. Since environmental problems in the product chain are often very complex and solutions are only possible, if many actors co-operate or at least do not jeopardise possible solutions, co-operation is of central value for environmental product innovation. The German Bundestags "Enquete-Commission" (1998 p.372) proposed (environmental) action groups for innovation in which actors and stakeholders of the whole product chain would participate.
  The state cannot initiate mandatory co-operation, but it can be stimulated by the following measures:

  - *Initiation of co-operation:* Co-operation may be supported by financial grants for the networking work. But also a frame for the building up of contacts between possible partners for the co-operation might be very helpful. This might be undertaken via round table discussions with all relevant groups from the industry including critical stakeholders, invitations or individual talks to possible partners.

  - *Government as a partner in co-operations:* Additional to partners from business and society, government itself, as a stakeholder of significant importance, often is a necessary partner in co-operations. Government might therefore propose to co-operate in problem-solving-process.

  - *Competitions:* Government may initiate co-operational competitions as a starting point for financial grants. In Germany, a competition to become a (funded) "Region of the Future" was a starting point for many regional networks, even, if they finally did not succeed in being awarded the funding.

Building Block "Information/ Communication"

- ***Capacity-building:*** The availability of R&D is essential for the understanding and influencing of an integrated product policy as well as for environmental innovation. Especially in small companies, the ability to take up advice and new ideas is very limited. This is the reason for our proposal, to help small companies in building up R&D capacity, either by qualification or by financial help in the first phase of employment. However, it should be considered that SMEs are often exclusively open for this kind of help under special circumstances, while at other times management is or at least feels at the maximum of its capacity with being involved in everyday business. Probably the single most important window of opportunity is a change of owner-managers and the ensuing learning-phase. Another situation were government initiatives to actively promote related programs would be at a time where it actively and significantly changes the environment of SME's: in the context of fundamental changes to the companies' legal environment or markets.

- ***Creating and promoting product labels:*** The European environmental label and national labels for environmental conscious furniture might be a starting point for increasing the market share of such products. It should be made known to consumers and retailers and developed to an important quality mark in competition. A mix of strategies (information campaigns, negotiations with companies to withdraw their own-brand labels and employ the standardised label) should be employed to ensure that the acquisitory potential of these labels is outperforming all other product-specific la-

[33] See an overview in Konrad/Nill (2001, 18 ff.). Rammert (1997) phrased it „Innovation in the net".

bels, so that most consumers will be able to distinguish this label from others in the market and include it in their relevant set of product features.

- ***Ecodesign Chairs:*** In many universities and design schools, environmental aspects are not very well represented in the curricula. Special lessons and chairs would be helpful to ensure, that young designers are "up to date" in environmental conscious design.

Building Block "Environmental product innovation"

- ***Ecodesign:*** Our results show, that environmental aspects are of no special relevance for most purchasing decisions concerning furniture. Only office equipment is an exception. Because of this fact, ecodesign should focus on advances concerning the whole product range and not on a special "eco-line" of products, which probably would be hard to market. In co-operation with the furniture manufacturers associations in the member states, special qualification programmes could be initiated, which qualify designers and engineers in the furniture firms. One possible means would be a written and printed /or internet based) eco-design guide for funiture.
- ***Design awards:*** Many design awards are publicly funded and in many design awards, furniture is included. It should be ensured, that in all publicly funded design awards, environmental aspects are properly regarded as important. Award winning furniture should serve as a good example in eco-design guides and qualification programmes.
- ***Environmental Management:*** In larger firms (>100 employees), environmental management is a possible means to implement not only process- but also product-related environmental aspects. EMAS II in special ensures a proper look on the products (see EMAS II guidance on indirect environmental aspects in: EU Commission 2001). Our research shows, that an EMS has positive impact on product related environmental activities and the implementation of EMS in larger SMEs should be a focus of governmental strategies.

Building Block "Reduction of toxics"

- ***Evaluation of suppliers:*** Evaluating suppliers with respect to environmental aspects is quite common. Evaluation of suppliers of furniture manufacturers as well as evaluation of furniture manufacturers by retailers could be a central way of phasing out toxics from the furniture chain and could as well serve as an important means of communication concerning all environmental questions. It should therefore be promoted and guided by government.

Building Block "Creating markets"

- ***Public procurement:*** In Germany alone, 5 million employees in public administration have to be equipped, most of them with office furniture. In hospitals, kindergartens, universities and schools, much more furniture is needed on a continual basis. Public procurement therefore *is* important for setting standards in furniture manufacturing. In Germany, and certainly in many other member states as well, written guidance on environmental conscious public procurement exists. It should be ensured, that such guidance is being used by as many public bodies as possible. The guidance itself should regularly be updated to follow new technical innovations and trends.
- ***Co-operative procurement:*** Furniture clients in public as well as private organisations could be brought together in purchasing. The development of environmental demands would thus become more efficient and the market power would be greater. Purchasing associations could be supported by financial grants to develop environmental demands, and special guidance could be developed to help in such processes.
- ***Environmental Management at Retailers:*** In larger retailer firms (>100 employees) environmental management could also help as a starting point to develop environmental consciousness and culture. A strategy to develop EMS in retailer firms could

therefore be a very powerful instrument for developments in the furniture chain.

- ***Direct Marketing:*** Since the big retailers (at least in Germany) are a bottleneck for development, direct marketing of furniture, e.g. in the internet, could be helpful. A higher added value would remain at the producing firms and innovative service concepts could be tested (see next point). Government could set up advising programmes and should safeguard, that big retailers do not oppose against such activities[34].
- ***New service concepts:*** We know about some examples in which furniture manufacturers try leasing their products. Especially in high value furniture for temporary short time use, there might be some economic potential, e.g. baby or children furniture. There might be some good reasons to support piloting of such ideas.

Building Block "Sustainable consumption"

- ***Guidance for retailers:*** Retailers should be informed about their role, influence and possible activities. The impact of product range, sales policy and sustainable consumption should be explained. It should be demonstrated, that "Good practises" really help in the transformation towards a sustainable society and that these practises are competitive. Guidance should be developed in co-operation with retailer's associations.
- ***Improving qualification of salespeople:*** A well known deficit in modern retail is the low qualification of salespeople. Qualification should be fostered by brochures, courses and the exchange of experiences.
- ***Improving the awareness of consumers:*** In a general context, consumers have to be made aware of their impact on the social and natural environment. The perceptual gap between individual behaviour and global effects must be closed. This will be a process of many, many years but it is an important basis for market change in all sectors. Health and safety aspects have been a valuable clue to consumers interests in the past fifteen years. Environmental and consumers organisations must further on be supported to maintain a high level of advice and information. But the subject must also be targeted in sector specific associations. For furniture, e.g. housewives associations could be a possible entrance.

Building Block "Waste Management"

- ***Take back, rework and disposal:*** Disposal of furniture is mostly done by bulk household waste. Some pilot projects to take back used furniture for recycling of materials have failed to meet economic expectations due to high transportation cost. Possibilities to reduce the amount of furniture waste are:
  - higher durability, timeless design and the possibility to change the appearance of furniture during the time of use (see chapter 9.2.2 "environmental conscious products") leading to a longer time of use and thus a lower amount of waste,
  - design for the dominating form of disposal, e.g. design for thermic use or for shredding,
  - take back and rework of high value furniture in special market segments, e.g. high numbers of office chairs manufactured to be easily re-equipped with new coverings.

[34] In Germany, an interviewee stated, that at any attempt to market directly, the purchasing associations of the big retailers would unlist the firm and thus cause a complete breakdown of turnover. Direct marketing would consequently be not possible for many firms.

9.3 Summary and IPP – policy advice for the textile industry

The textile finishing industry is a very process-focused supply industry of the clothing manufacturers. The market it is more differentiated over process- than product qualities. “Environment” was not regarded as an important factor of competition.

25 of 30 firms have one employee who is responsible for environmental aspects. R&D capacities correlate positively with IPP-related activities. In the group of the beginners, R&D is low while in IPP-practising firms it is high.

The ecotex-100 label and other business-to-business instruments of environmental communication, particularly product data sheets, are almost generally used in all groups and are basis for co-operation. From these instruments, a considerable effect comes to the firms. Many firms (17 from 30) have introduced an environmental evaluation of suppliers. This could be one consequence of the successful implementation of the ecotex-100 label.

The introduction of EMS brings an increased number of process- and product-directed environmental initiatives. EMS are relatively wide spread in the group of the IPP-practising firms.

The co-operation within the textile industry to improve environmental protection is established in all IPP-groups. Giving environmental information is more usual for the intermediate firms than for the beginner and the advanced group.

Firms complying with a relatively high number of IPP-criteria, have more qualified employees and new machines. In the last five years the decrease in these firms was in comparison to the others the lowest, furthermore they expect a higher rate of growth. With regard to profit, IPP-practising firms are similar to the other groups. Consequently, they can be regarded as economically more efficient.

The interviewees from all three groups, who were in most cases the persons who are responsible for environmental aspects, don’t have remarkably different views in all questions measuring their attitudes.

In the finishing textile industry, strategies of change cannot be built on the active competitive behaviour of quite intrinsically motivated “ecopreneurs”[35] as it is for example possible in the fruit- and vegetable processing. With regard to the textile finishing industry, it can be assumed that the technically highly competent firms with their qualified staff want, and are also able, to fulfil further requests of trade and the clothing manufacturers.

Neither the passive position of the textile sector concerning product development nor the integration in the textile chain as a kind of service industry (finishing companies acting as service provider) makes it possible to the small and medium sized firms to be an active part in changing the markets via product development or marketing.

The dynamic changes of environmental protection in the textile industry can be drawn up as follows:

[35] Schaltegger, Stefan und Petersen, Holger, Ecopreneurship – Konzept und Typologie, Luzern 2001

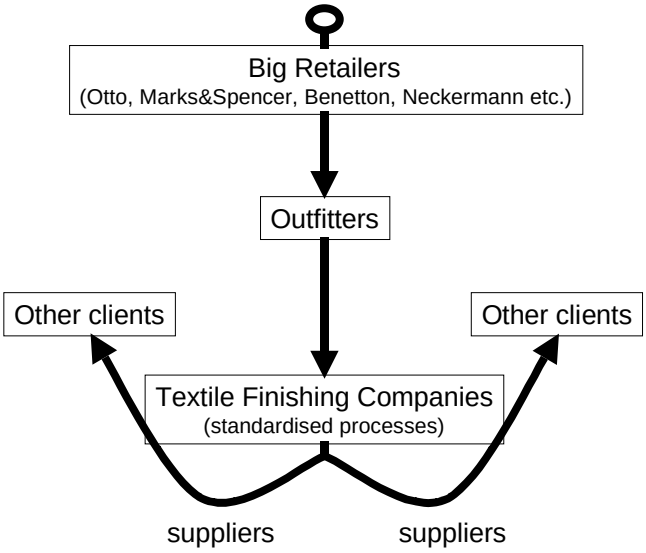

Fig. 9.3: Anchoring environmental protection in the textile chain

Characteristic for the textile industry is a high degree of division of labour and a multitude of different materials used and processes employed. The extend of domestic production is rather small. For that reason, the textile chain is a very good example for a complex, globalised division of labour in modern production. Even though – particularly for clothing textiles – an effort of communication is made with regard to harmful substances in the materials supplied, there is not enough communication about production processes between the actors along the product chain. However the ecological potentials are often on the level of processes.

The description of fundamental connections between possible IPP-initiatives and the aim to improve the competitiveness of the SME's of the textile industry that follows is: Most parts of the initiatives focus on the modules "sustainable consumer" and "building up markets". A successful implementation of initiatives from these two modules would lead to an advantage for the ecological forerunner in the textile industry and would consolidate their market position and probably offer the opportunity to improve this position. At the same time, particularly within the modules "information and communication" as well as "product innovations", a range of initiatives are proposed which support the beginner and the advanced group to achieve the level of the IPP-practising firms. The development would be for the benefit of the practising firms at first, but later produce initiatives of innovation and adoption in the whole sector. In the process, initiatives which are directed towards the market and which improve competitiveness would be on focus on a continuous basis.

9.3.1 Clothing retail and clothing manufacturers

Practising IPP could achieve a considerable effect in the textile chain, if these consider properly that clothing retailers dominate the textile chain. As a consequence, (especially big) clothing retailers are the singularly most important gatekeepers (together with clothing

manufacturers in possession of strong own-brands)for environmental improvements in the product group.[36]

In contrast to the furniture industry, clothing retail and clothing manufacturers are open for such initiatives. At the moment, there is a fundamental problem for these powerful actors that is difficult to come over: Market demand is too low to enable economies of scale that would make integrated ecologically optimised textiles available at prices that are at the same time cost-covering and competitive.

In contrast to that, the time has come for all clothing textiles to comply with the requirements of the ecotex-100 standard. Anyway, the dynamics shown in figure 9.3 already put the textile finishers into the situation, that the pressure of important customers to change production processes with respect to chemicals used has also influenced other customers (who don't ask for related changes) on the basis of the finisher employing the same quality-level of processes for all customers, so that all customers are supplied in compliance with ecotex-100 in the end. This does not necessarily imply that the ecotex-100 label is employed with all customers.

9.3.2 Creation of a level above ecotex-100

An increase of the standards at individual companies could be achieved, for example, with more drastic requirements from the most important buyer. As a consequence, the clothing manufacturer would have to apply these requirements to the textile finisher who would meet, because of their interest to minimise process variety, both the demands of the great (for example Otto, Marks&Spencer, Benetton, Neckermann) and of the smaller customers with the same degree of (environmental) quality. This mechanism would naturally be more probable to work for changes in processes than if high-quality customers would only be supplied with products that have been washed more thoroughly, which is for example at current water and energy prices often the cheapest way to comply with ecotex-100. Such activities should be accompanied by initiatives to establish markets, because even the big retailers are not able to push higher standards on the market on their own and not in co-ordination with other important players.

9.3.3 Possible initiatives

The following suggestions do not target the textile finishing industry alone, but include the textile sector as a whole. Synergies between initiatives have been pointed out where they are of relevance. The description of possible concrete projects follows the model of the seven modules of an IPP.

Building Block "Sharing of tasks"

- ***Co-operation with advisors and informational sources:*** Given the very limited entry of new human capital into the textile finishing sector (due to the ongoing shrinking process), suppliers of machinery and even more suppliers of materials are probably at present the most influential source of advice for the finishers outside the textile chain. Any performance-pushes downstream the textile chain with consequences at the production process level should be in co-ordination with process technology available at affordable prices from suppliers of machinery and materials. It should not be taken for granted that Win-Win-potentials with respect to costs and environmental performance are a well-known fact.

[36] The business houses surely are the best partners. Also the power due to environmental and market-changing activities of important clothing manufacturer is limited. For example the attempt to introduce three ecological textile collections on market that was made by the firm Steilmann failed in the second half of the nineties.

- ***Communication of responsible product management:*** 'Green' clothing is quite often misunderstood as 'healthy' clothing (e.g. eco-tex is for the most part a health standard as it mainly targets substances in the final product). A view of responsible product management that includes production processes should be promoted in the textile chain, even if international division of labour, secretive industry culture, short planning periods and rather limited budgets for process changes may provide formidable obstacles in this direction.
- ***Benchmarking of good practises:*** A lot of practises in responsible product management exist, but are not sufficiently well known throughout the respective industry. Excellent practises and measures should therefore be collected and communicated in intervals in a kind of "benchmarking-report".
- ***Co-operation:*** The complex nature of clothing products increases the need for and the obstacles to co-operation. This complexity can only be managed if knowledge from the different links of the textile chain can be integrated. But given the difficult nature of any effective verification of suppliers' compliance with requirements that do not show in the product but in the exporting country (e.g. in terms of degradation of social and natural environments), any isolated activities show heroic qualities. On the other hand, conceptually obvious win-win-potentials lie in un-clarified quality dimensions with regard to their relevance for the final product. These are quite often unknown at early production stages and so resources are wasted on qualities that do not matter. However, government cannot initiate mandatory co-operation, but it can stimulate it by the following measures:
  - *Initiation of co-operation:* Co-operation may be supported by financial grants for the networking work. But also a frame for the building up of contacts between possible partners for the co-operation might be very helpful. This might be undertaken via round table discussions with all relevant groups from the industry including critical stakeholders, invitations or individual talks to possible partners.
  - *Government as a partner in co-operations:* Additional to partners from business and society, government itself, as a stakeholder of significant importance, often is a necessary partner in co-operations. Government might therefore propose to co-operate in the problem-solving-process.
  - *Competitions:* Government may initiate co-operational competitions as a starting point for financial grants. In Germany, a competition to become a (funded) "Region of the Future" was a starting point for many regional networks, even, if they finally did not succeed in being awarded the funding.
  - *Provision of platforms for co*-operation between domestic companies and NGO's from less developed countries to facilitate control of foreign companies' compliance with process-related standards.
  - *Promotion of computer*-based product data management systems: Product data management system can play a vital role in reducing the complexity of product design decisions that affect multiple protagonists in the product chain. This reduction of complexity may be essential in enabling SMEs, with their typically limited management resources, to remain competitive in a business environment where low prices and rising (processual) quality requirements are combined.

Building Block "Information/ Communication"

- ***Capacity-building:*** The availability of R&D is essential for the understanding and influencing of an integrated product policy as well as for environmental innovation. Especially in small companies, the ability to take up advice and new ideas is very limited. This is the reason for our proposal, to help small companies in building up R&D capacity, either by qualification or by financial help in the first phase of employment. However, it should be considered that SMEs are often only open for this kind of help under

special circumstances, while at other times management is or at least feels at the maximum of its capacity with being involved in everyday business. Probably the single most important window of opportunity is a change of owner-managers and the ensuing learning-phase. Another situation were government initiatives to actively promote related programs would be at a time where it actively and significantly changes the environment of SME's: in the context of fundamental changes to the companies' legal environment and markets.

- ***Creating and promoting product labels:*** Many green and apparently green clothing labels exist and they are being extensively used. The quite well known problem is that consumers consider these labels in their buying-decisions only to an extremely limited extent: in situations where they buy babies' clothes. An important issue is quite probably that clothes for oneself are not being bought *because* they are environment-friendly, but because (i) they look good and (ii) they are affordable relative to the consumers clothing-budgets. Compatibility to the natural environment is only an add-on and this is again only true if the consumer perceives related claims to be credible. From a distance, dozens of different labels do not communicate credibility, because consumers will assume that many of the, to the lay public, undistinguishable labels will not all be as efficient in ensuring environment-friendliness as they claim. In the myopic context of everyday buying-decisions, a general mish-mash of competing eco-labels will fail to become part in buying decisions at all (apart from being a subliminal part in the seller's image). A mix of strategies (information campaigns, negotiations with companies to withdraw their own-brand labels and employ the standardised label) should be employed to ensure that the acquisitory potential of a single, credible and sufficiently demanding label is outperforming all other product-specific labels, so that most consumers will be able to distinguish this label from others in the market and include it in their relevant set of product features.

Building Block "Environmental product innovation"

- ***Ecodesign:*** The market for clothing that looks environment-friendly is quite clearly a niche-market product. As pointed out before, visual and haptic appearance as well as affordability dominate clothing buying decisions; eco-style products as such are not "trendy" for most consumer segments and their price (in part due to lacking economies of scale) is relatively high. Our proposal is to address the price issue only implicitly by increasing production volumes first. The design idea would be to create products that are much more "eco" than most current clothing products, though at first maybe not as much as the current "eco-niche". Areas where a gain in environment-friendliness is complementary or neutral with cost reductions should be explored systematically . As more and more knowledge is being created, the environmental standard of ordinary clothing products can rise without affecting price or appearance.
- **Offering technological options**: The clothing market is often and in many respects, even to the informed observer, a rather unpredictable phenomenon. It is, however, quite predictable not to accept as a whole any "eco-style" range of products. Creating markets for environment-friendly clothing can not work. What quite probably does is creating (technological) options to serve more and more of the whimsical and volatile fashion segments with environment-friendly clothing.
- ***Design awards:*** A design award with the focus of up-to-date fashion with ever more environment-friendly technological background would may be a starting point for the aforementioned ecodesign-scheme. A well known eco-label for clothing would probably be a good visual marker at product level that could be promoted in the context of the proposed award-scheme. The award would primarily target decision-makers in the clothing chain, while a connection to a strong eco-label might be critical in making the award sufficiently relevant to said decision-makers.
- ***Environmental Management:*** In larger firms (>100 employees), environmental man-

agement is a possible means to implement not only process- but also product-related environmental aspects. EMAS II in special ensures a proper look on the products (see EMAS II guidance on indirect environmental aspects). Our research shows, that an EMS has positive impact on product related environmental activities and the implementation of EMS in larger SMEs should be a focus of governmental strategies.

Building Block "Reduction of toxics"

- ***Evaluation of suppliers:*** Evaluating suppliers with respect to environmental aspects is quite common. Evaluation of suppliers of clothing manufacturers as well as evaluation of clothing manufacturers by retailers could be a central way of phasing out toxics from the textile chain and could as well serve as an important means of communication concerning all environmental questions. It should therefore be promoted and guided by government. An effective response to the international dimension of the clothing chain is of greatest importance for further reductions in toxics. Retailers' short-term reactions to emerging market trends that they have not been expecting often jeopardize efforts to minimize toxics in clothing.
- ***Substitution of harmful substances and processes:*** Toxics are employed as means to an end. Evaluation of suppliers can only work if the supplier has technological alternatives in delivering the required product. In order to move suppliers to better environmental performance, the technological alternatives have to be shown. Otherwise the only effect will be more washing and finally the same toxics in more wastewater.

Building Block "Creating markets"

- ***Public procurement:*** Public procurement is of high relevance in the textile market (hospitals, uniforms, business clothing). Public procurement therefore *is* important for setting standards in textile manufacturing. In Germany, and certainly in many other member states as well, written guidance on environmental conscious public procurement exists. It should be ensured, that such guidance is being used by as many public bodies as possible. The guidance itself should regularly be updated to follow new technical innovations and trends.
- ***Co-operative procurement:*** Textile clients in public as well as private organisations could be brought together in purchasing. The development of environmental demands would thus become more efficient and the market power would be greater. Purchasing associations could be supported by financial grants to develop environmental demands, and special guidance could be developed to help in such processes.

Building Block "Sustainable consumption"

- ***Improving qualification of salespeople:*** A well known deficit in modern retail is the low qualification of salespeople. Qualification should be fostered by brochures, courses and the exchange of experiences.
- ***Improving the awareness of consumers:*** In a general context, consumers have to be made aware of their impact on the social and natural environment. The perceptual gap between individual behaviour and global effects must be closed. This will be a process of many, many years but it is an important basis for market change in all sectors. Health and safety aspects have been a valuable clue to consumers interests in the past fifteen years. Environmental and consumers organisations must further on be supported to maintain a high level of advice and information.

Building Block "Waste Management"

- ***Second Hand trade:*** The second hand trade with textiles is well developed compared to other sectors. Studies to structure, possible performance, environmental impact as well as possibilities of development are not known. It could be possible, to integrate second hand trade into policy thinking.

9.4 Summary and IPP- policy advice for fruit- and vegetable processing

In the fruit and vegetable sector, the cultural differences between firms concerned about the environment and other were highest. There is a distinctive IPP-group of practising firms which have the (explicit or implicit) strategy to focus on organic products and market development and that have environmental conscious persons responsible, who think in a remarkably entrepreneurial way. Most of the companies have products that are commercialised in the organic segment.

In comparison to the beginners and the advanced group, the persons in the IPP-practising firms who are responsible for environmental protection have a more environmental attitude than the others. In particular, they perceive environmental legislation as an incentive to improve production efficiency, whereas it is for most of the other group an obstacle to competitiveness. They stress the importance of personal responsibility at all levels and their reason to pursue their active approaches is the individual motivation to do something for environmental protection. This group seems to be comparable with the type of ecopreneurs which is described by Schaltegger[37] who wants to change the mass-market (even though it works in a niche).

25 companies buy raw materials following criteria of organic agriculture, 19 of them buy "real" products from organic agriculture, 6 restrict themselves on some criteria and 24 of 34 buy raw materials from the region. 12 companies earn more than 50% of their sales in the organic food segment, ten of them their whole turnover. Most of these firms are members in specialised marketing and production standards organisations (in Germany e.g. DEMETER, BIOLAND etc.). They show remarkably more activities in marketing (fairs, customer information) than the conventional businesses.

Most firms (>80%) avoid artificial ingredients. From the verified substances only preserving agents were used by 10 from 34 companies.

R&D is more pronounced in the practising group and the intermediate firms than in the group of the beginners.

After introducing EMS (only 7 cases), neither in product nor in process related environmental aspects progress is achieved with commencement of new responsibilities.

The industry has definitely high qualified environmental officers. 17 from 23 have a degree or a diploma. Ten companies (29%) complain about the lack of qualification in their firms. Mostly all intermediate firms evaluate their suppliers.

The IPP-practising firms have significantly more qualified staff and newer machines. In the last five years, the growth in employment in this group was the lowest, but the group shows the highest part of growing companies and mostly all see chances of growth in the future. They are the best exporters. With regard to profit, the IPP practising firms perform as good as the other groups. Therefore they can be regarded as economically more efficient.

9.4.1 Organic food as the clue to overall environmental performance

In comparison environmental conscious products with the furniture- and textile industry the fruit and vegetable processing comes off well due to two points:

1. The sector has a recognisable and high-quality level for integrated ecological products; basis is the EU-Organic-Food-Regulation (No. 20/92/91). There are some intro-

[37] Schaltegger, Stefan und Petersen, Holger: Ecopreneurship – Konzept und Typologie, Luzern 2001

duced private labels like (in Germany e,g, Bioland or Naturland) as well as in Germany the new national Bio-Siegel.[38]

2. With regard to the high–quality of the products (presumably with above-average contribution margins), the industry co-operates in marketing organic products because of the very good chances of development. At the beginning of the millennium, biological products were not only to be found in organic products shops but also in supermarkets.

The sector is presumably at the starting point/ beginning of a diffusion process for the next one or two decades that could lead to an increase of the market share of organic products on the mass market.

The description of fundamental connections between possible IPP-initiatives and the aim to improve the competitiveness of the SME's of the fruit and vegetable processing that follows is: Most initiatives focus on the modules "sustainable consumption" and "creation of markets". A successful implementation of initiatives from these two modules would lead to an advantage for the IPP-practising firms of the sector and would consolidate their market position and would probably open the opportunity to extend this position. At the same time, particularly within the modules information and communication as well as "product innovations," a range of initiatives is planned which support the beginner and the intermediate group to achieve the level of the IPP- advanced firms. The development would be for the benefit of the advanced firms at first, but later produce activities of innovation and adaptation in the whole sector. In the process initiatives which are directed on the market and which improve competitiveness would permanently be on focus (figure 8.3).

9.4.2 Possible initiatives

The following initiatives are only partly useful for the fruit and vegetable processing in a separate way. In part they will develop an effect within the general context of the food industry. They can be distinguished into two different sets: on the one hand in initiatives addressing more than one module and on the other hand initiatives that can be categorised into one of the seven IPP-building blocks.

9.4.2.1 Multiple building block initiatives

- ***Food or fruit- and vegetable as a pilot project of an IPP:*** IPP is still a vague concept. For that reason there must be concluded that an intensive work of translation from general ideas of an IPP and real existing experiences and possibilities of an IPP is necessary.

  Because of the diversity of problems within the food industry we propose to carry out a pilot project in the smaller fruit- and vegetable sector as an example. The concrete implementation could follow the essential features written by Rubik (2000), but at first we recommend a co-ordination of the activities with the EU, member states and regions.

  Such a project offers the industry the possibility to co-develop the operationalised definition of an IPP for their industry. To start out from practical experiences from the product group fruit and vegetable the industry could function as defining forerunner.

- **Trade discourse IPP:** To carry out a discourse on IPP could be a further initiative. For this, a co-operation with the respective industry association, the IHK-Representation and the important protagonists in agriculture (for example CMA) in order to organise workshops, circulars etc. to specifically discuss an IPP.

[38] According to information of the BMVEL already 11 weeks after the presentation of the label more than 600 firms (producer, finisher and trade) dealed with the integrated label on packaging or as main guide for biological products at supermarkets.

9.4.2.2 Initiatives in the seven building blocks

The description of projects that can possibly be realised follow the model of the seven building blocks of an IPP. The aim of our proposals is to stimulate the transformation of the mass market for food. Especially with regard to the experiences of evironmental policy from the last couple of years, we point out that environmental aspects are not a feasible unique selling proposition (USP) in the mass market, but they should be integrated into the practices of the firms that have any part in food production. Use as an USP is recommendable in some smaller market segments which place higher value on issues of healthy/organic food and (relatively more) environment/animal-friendly methods of production.[39]

Initiatives in the building block "division of tasks"

- ***Co-operation with with advisors and informational sources:*** The information which is available and preferred at the moment should be integrated into the continuation of an IPP and get mobilised as (both formal and informal) knots of information for the purpose of an IPP.
- ***Co-operation:*** Innovations are mostly an effect of co-operations or networks where different actors are involved. The food processing already has many ecological co-operations that exist both on the level of agriculture (in Germany e.g. Bioland, Biopark a.o.) and on the level of producers and distributors (in Germany e.g. the association for organic food and environmental conscious products (BNN)) where for the most part the IPP-practising firms are already members. Governmental strategies in order to support co-operations could on the one hand improve and increase the existing co-operations and on the other hand, while expanding the organic market segment, also newcomers could be integrated into the co-operation in the market.

Initiatives in the building block "information and communication"

- ***Capacity building:*** Availability of R&D facilitates the taking up of IPP-thinking. Especially in small firms with little R&D capacities, the taking up of innovations is a challenge. For this reason we propose governmental bodies should finance seminars and workshops organised by industry associations and associations for organic food production for food processing firms. The funded seminars and workshops should strengthen the knowledge-based competencies of the food processors in purchasing, processing and marketing for the bio-segment of the food market.
- ***Increasing brand-recognition of important product labels****:* The German national organic food label as well as the standards-wise similar labels of the cultivation associations bear special significance in the foods market. These labels are well-known to professional protagonists in the market. Their recognition (and consequently their market relevance) by consumers could well be increased. This is especially true for price-oriented consumers.

Initiatives in the building block "environmental product innovation"

- ***Organic products:*** Our findings show that the managers of first movers in the market for organic (bio) products are often intrinsically motivated. They differ in their environmental attitudes and their market behaviour were, on a qualitative basis, found to be a consequence of their differing attitudes. For this reason, bio products for a long time were strongly associated with a "grassroots, alternative, anti-hedonistic" lifestyle. This in turn was a reason for many conventional manufacturers to avoid these attributes in their image portfolio and launching products in the connected niche-market. An image shift for bio products was a necessary prerequisite for conventional manufacturers to enter the market for organic products. Our findings suggest that this shift, at least in

39 With regard to the strategy in the retail sector Villinger et al (1999)

Germany, has finally happened and that more and more conventional manufacturers launch products in the organic food market. These manufacturers should be given support with an emphasis on supply for and marketing of organic products, and compliance with the EU bio foods decree.

- ***Pre-processed products:*** A frequent obstacle for the taking up of organic products by major clients (e.g. canteen kitchens) is lacking on-time availability of ready-to-use (pre-peeled and pre-cut) fruit and vegetable. A number of IPP-practising firms from our sample fill this very niche. An IPP should check whether these supply shortages do still exist and how a sufficient number of additional suppliers can be encouraged to supply these products.
- ***Market entry of major food processors:*** Some major food processors still hesitate to enter the organic food market (-segment). In the context of an IPP and after verification of this finding, governmental bodies should probably initiate round tables to identify and eliminate obstacles.
- ***Convenience products:*** Due to changes in lifestyles and private everyday time management, there is a strong demand for convenience products. Yet convenience products seemed to be a contradiction to the thinking behind organic food production. As a consequence, convenience products were not popular with producers of organic food. Yet this relationship is changing, even in organic foods shops. At the time of our interviews, major convenience food processors (e.g. Nestlé baby food) exerted a significant demand, e.g. for frosted vegetables. Despite this, organic convenience foods appear currently under-represented in the market. The question whether bio convenience can be developed and how this process could be speeded up by governmental support should be established in detail in industry talks.
- ***Easier access to capital for investment-bound innovations:*** Access to public credits (EU development programmes, KfW, deutsche Ausgleichsbank) should be facilitated and should become more transparent.

Initiatives in the building block "reduction of hazardous substances"

- **No proposals.**

Initiatives in the building block "creating markets"

- ***Public procurement:*** Public procurement plays a major role as a buyer of food (e.g. canteens, hospitals, kindergartens) and as such as a buyer of fruits and vegetables as well. The UBA handbook on public procurement (1999a) offers good advice on the subject. Governmental bodies should embed their related activities in an IPP. Promotion of these ideas on a communal level, if not already put into practice, should be considered.
- ***Co-operative procurement****:* Apart from the mobilisation of public procurement, a multitude of business and institutional buyers could be brought together for the integration of their buying power. This integration could be established on regional (e.g. co-operation of buyers from a specific region) or horizontal level (e.g. cross-regional co-operation of similar buyers). Environmental policy could support business and public buyers via project-bound support (funding and/or other resources) or through responsive provision of information.
- ***Direct marketing****:* Direct marketing of organic food is a major marketing channel in the organic food market, employed mainly by farmers and very small processing firms. Government support is usually given on a communal level, e.g. regionally-oriented weekly markets, guides to farm-shops etc.) An IPP could identify and eliminate gaps in the direct marketing system via market studies.
- ***Improving qualification of salespeople:*** A major deficit of conventional retail with respect to organic products is the low qualification of salespeople. Qualification should

be fostered by brochures, courses and the exchange of experiences.

Initiatives in the building block "sustainable consumption"

- ***Increasing the awareness of consumers:*** Consumers' demand for organic food will be stimulated by the BMVEL and other protagonists. Any IPP should be in co-ordination with current programmes and, if possible, target synergies.
- ***Bio supermarkets****:* Apart from supermarkets entering the upper price-segments, some "Bio supermarkets" are being established in some urban areas. They will probable constitute a complementary impulse to the market as a whole. An IPP could probably use market studies to identify further, promising locations for bio supermarkets and work to close identified geographical supply gaps.

Initiatives in the building block "waste management"

- **No proposals.**

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