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[1] The opinions expressed in this paper are those of the authors and do not necessarily reflect the views of UNCTAD.

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Abstract

An increasing volume of exports from the south is subject to environmental regulations in northern markets. The frequency of incidence of these measures, their coverage in value terms and their impacts on the market access for exporters from developing countries, are the subjects of this paper. In order to assess the extent and coverage of such environmental measures two indices are developed - the Frequency Index of Environmental Measures (FIEM) and the Coverage Index of Environmental Measures (CIEM) - and are applied to developing countries' exports to the EU market in 1992. In order to assess the impacts of environmental measures on the market access of products from developing countries, the results of a survey among Zimbabwean exporting firms are presented. It is concluded that FIEM and CIEM are potentially valuable monitoring tools and some recommendations for further work are proposed.

Resumen

Un volumen creciente de exportaciones procedentes de los países del Sur debe sujetarse a regulaciones ambientales en los mercados del Norte. En esta monografía se explora la frecuencia de esta medidas, el cubrimiento en términos de su valor y el impacto en el acceso al mercado para los exportadores de países en desarrollo. Con el objeto de evaluar la extensión y cubrimiento de estas medidas ambientales, se han desarrollado dos índices: el índice de frecuencia de medidas ambientales (IFMA) y el índice de cubrimiento de medidas ambientales (ICMA), los cuales se aplican a las exportaciones de países en desarrollo a los mercados de la Unión Europea en 1992. Para medir el impacto de las medidas ambientales en el acceso al mercado de productos provenientes de países en desarrollo, en este estudio se presentan los resultados de unas encuestas realizadas entre firmas exportadoras de Zimbabwe. Se concluye en el reporte que el IFMA y el ICMA son instrumentos de seguimiento potencialmente útiles, y se proponen, además, otras recomendaciones para trabajos futuros.

Abrégé

C'est un volume croissant d'exportations en provenance du Sud qui se trouve soumis, dans les marchés du Nord, à des réglements de protection de l'environnement. On traite, dans ce document, de la fréquence d'application de ces mesures, de leur portée en termes de valeur et de leurs effets sur l'accès aux marchés du Nord pour les exportateurs des pays en développement. Afin d'évaluer l'étendue et la portée de ces mesures de protection de l'environnement, deux indices (l'indice de fréquence des mesures environnementales [IFME, *FIEM* dans le texte] et l'indice de portée des mesures environnementales [IPME, *CIEM* dans le texte]) ont été laborés et appliqués aux exportations des pays en développement vers l'UE en 1992. Pour évaluer les effets des mesures de protection de l'environnement sur l'accès à ce marché pour les produits des pays en développement, on présente les résultats d'une enquête menée auprès de maisons d'exportations du Zimbabwe. On parvient à la conclusion que le *FIEM* et le *CIEM* sont de précieux instruments d'observation. Quelques recommandations sont ensuite formulées en vue de la poursuite de ce travail.

Contents

Introduction

An increasing volume of trade from developing countries is subject to environmental product measures upon entering developed country markets, such as the European Union (EU) and the USA. The frequency of incidence of these measures, the coverage in value terms and the impacts of these trade-related environmental measures on the market access for exporters from developing countries, are the subjects of this paper.

Environmental objectives and standards differ among countries, reflecting differences in levels of economic development, relative endowments of natural resources and environmental assets, and preferences for environmental quality. In the final analysis, the objectives and standards are the result of the trade-offs that governments and their citizens make between the provision of environmental services and other goods and services that satisfy human wants.

These differences in environmental objectives and standards may lead to problems among trading partners. A product which is perfectly acceptable in one market may not be so for another. This may be due to certain characteristics of the product itself which may be harmful to the environment (eg. containing polluting substances) or because of the environmental impacts of the production process. As part of their environmental policies, governments may want to ban or restrict the import of environmentally unsound products or levy a charge on them.

Environmental measures which affect imported products are based predominantly on the characteristics of the products themselves; they include for example banning certain dyes in clothing and carpets, packaging rules, consumer taxes on fuels, a range of obligatory labelling requirements, the prohibition of CFCs and halons, and re-use and recycling requirements. Current international trade law offers governments a fair amount of discretion to apply the same environmental standards for imported products as those applied to domestic products, when the standards refer to product characteristics. However, trade law offers few possibilities to apply import standards on the basis of production processes - the so-called processes and production methods (PPMs). There is an on-going discussion within the World Trade Organization (WTO) on the extent to and the circumstances under which environmental measures should be allowed to be applied to imports, based on the way they are produced or processed.

This difference in approach is understandable. In the case of a product itself carrying a polluting agent, the environment of the importing country is at risk. However, the environmental impacts of production and processing occur only in the exporting country and where importing governments have no legal authority. Environmental objectives and standards may vary between the exporting and the importing country for the reasons stated above.[2]

Nevertheless, there are pressures in the North to harmonise international environmental production standards. Industries often perceive differences in environmental standards as constituting 'unfair' trade when like industries in different countries are confronted with diverging environmental standards and compliance costs. Environmentalists, too, often oppose the idea that like industries in different countries should be subject to different ('double') environmental standards. These pressures could lead to the adoption and spread of a new type of trade-related environmental measure based on the environmental impacts of the production processes.

These trade-related measures are implemented predominantly in the North. Southern producer countries are concerned that the proliferation of measures, together with the pursuit of international harmonisation of environmental standards will thwart their development aspirations in various ways. They fear that Northern environmental standards, which tend to be stricter, will be imposed on them, resulting in relatively higher compliance and transaction costs and/or reduced market access for their export products, especially if their position in the market is weak. Apart from the stringency of Northern standards, a variety of (often changing) environmental standards and regulations in export markets makes world trade complex and less transparent at the level of individual products. The costs for information and adaptation will be born by developing countries' exporters. In addition, a variety of different environmental measures can easily result in trade distortions as well as disguised forms of protectionism, albeit unintentional. In effect, it has been stated that the regulations are "cumbersome, complex and at least partly designed to make exports [from developing countries] uncompetitive" (Markandya, 1995).

Only circumstantial evidence is available on the extent and impact of environmental product measures on developing countries' exports. UNCTAD, in co-operation with UNDP (INT/92/207) and UNEP (INT/93/A48) has coordinated a series of country case studies (Markandya, 1995), which imply that the impact is not yet significant, apart for a few products. However, the number and diversity of environmental measures in the North that may have a trade impact is still increasing. It is therefore worthwhile investigating the number and diversity of environmental measures applied in developed country markets, and which export trade flows from developing countries they might affect. This is the aim of this research oject. To clarify, if a product faces an environmental measure in export markets, it is not *a priori* evident that this will hinder trade; it indicates only that there is a possibility of an undesirable trade effect.

[2] The distiction may be less clear-cut when the environmental problems during production or processing are international or global in geographical scope (for more discussion on this issue see Verbruggen and Kuik 1997).

The study employs the GREENTRADE information system, developed by UNCTAD. The next section presents an overview of this system, the uses to which it may be put and the different categories of environmental measures, particularly the possible trade effects of these measures. In the subsequent section, two simple indices are developed to determine the frequency and coverage of trade-related environmental product measures. These indices are called the Frequency Index for Environmental Measures (FIEM) and the Coverage Index for Environmental Measures (CIEM). This is followed by a descriptive analysis of these indices per type of environmental measure, per group of traded products and for different South-North trade flows, following the classification of traded goods according to the Harmonised System (HS) nomenclature. The FIEM and CIEM are calculated for Latin America, Asia and Africa separately, for developing countries' exports in total, and for nine selected individual developing countries. The indices provide an overview of the incidence and coverage of trade-related environmental measures, but do not show the impacts of these measures on trade. In order to provide some indications of these impacts, section 5 presents the results of a small survey among industrial firms in Zimbabwe on their perceptions of the economic impacts of trade-related environmental measures in their export markets. This is followed by some conclusions and recommendations.

The GREENTRADE Information System

Since the early 1980s, the Secretariat of the United Nations Conference on Trade and Development (UNCTAD) has been reviewing the import regimes of its member states. To this end, documentation has been collected on what has been termed Trade Control Measures (TCMs) applied by governments. TCMs comprise both import and export controls, of which the most unambiguously trade-restricting ones are tariff charges and quantitative restrictions. These measures, plus the trade statistics of the two most recent years available, are included in an automated trade information system (TRAINS), which has been developed to inform exporters about the relevant TCMs which will affect their exports in foreign markets.

In the light of newly emerging environmental policies with a possible trade impact, the UNCTAD Secretariat was given a mandate to establish a database containing product-specific environmental policy instruments with possible trade effects. To this end, GREENTRADE is being developed. GREENTRADE is a computerised information system that allows encoding and retrieval of information on environmental product concerns and measures, and which is now part of UNCTAD's TRAINS system (as of version 4.0, 1996).

More specifically, two types of information may be found in the GREENTRADE system. First, per HS product line or product, GREENTRADE provides detailed information on environmental measures with a potential effect on market access and trade. Thus, it reveals that Japan introduced an eco-label for treated tyres in February 1989, awarded for items comprising 100 per cent recycled tyres. In some cases, additional information is available on the source of information, the trading partners affected (indicating a country-specific application of the measure, if any), and the date of termination of the regulation, if applicable. Specific comments provided by UNCTAD member countries on their own trade-related environmental measures may also be found.

Second, GREENTRADE contains glossaries which allow the user to gain insight into the basic facts, concepts and principles of the trade and environment interface in general, and trade-related environmental measures in particular. Among the various issues are, for example, the GATT/WTO articles and jurisprudence that are relevant for the trade and environment debate, and an overview of important multilateral environmental agreements, indicating the extent to which, where possible, trade measures are used to achieve the objectives of these agreements.

GREENTRADE distinguishes three broad categories of trade-related measures used for environmental purposes, subdivided into 16 specific types of measures. Table 1 provides an overview.

Table 1. Trade-related measures used for environmental purposes, GREENTRADE

Economic Instruments
- charges and taxes on product, emissions or energy used
- administrative charges
- tax differentiation
- deposit refund schemes

Technical regulations and standards
- prohibited products
- product standards
- deposit return obligations
- packaging requirements
- labelling/marketing requirements
- eco-labelling programs
- testing/inspection/quarantine regulations
- other regulations/standards

Quantity import control measures
- import licensing/permit/authorisation
- import quotas
- import prohibition
- state monopoly/sole importing agency

Source: GREENTRADE

Both the coverage and the impact on trade of these environmental measures may vary substantially, depending on the specific measure in question and pertinent circumstances. With respect to coverage, it is difficult in many cases, and sometimes even impossible, to identify the products, in terms of the HS classification, subject to specific environmental measures. Environmental measures are, for instance, quite often not directed at a specific product or product group. Instead, they formulate technical specifications across-the-board, such as standards on the use of certain substances, standards on energy efficiency or polluting emissions. Environmental measures often specify the controlled substances or technical specifications, not the products that are affected by these measures. Another typical problem in this respect is that some environmental measures prescribe certain operational and organisational actions. This is the case, for example, in packaging requirements, take-back responsibilities and obligatory deposit-refund systems. It is not easy to determine exactly the products from developing countries that are subject to the German regulations on packaging.

Yet another problem regarding coverage is the open and voluntary character of some environmental measures, such as voluntary eco-labelling schemes. Does the mere existence of an eco-label scheme for writing-paper in the Dutch market imply that all exports of writing-paper from developing countries to the Netherlands are 'covered' by that environmental measure? Whatever the answer, it is clear that there is some element of arbitrariness. Finally, it may also be the case that an environmental measure is indeed very specific and affects only part of an HS tariff line. This is the case, for example, for items subject to trade provisions under CITES. In other words, in identifying products covered by environmental measures according to the HS classification, a certain degree of arbitrariness is unavoidable, which means that an over- as well as under -estimation of trade flows covered by these measures is possible. The descriptive analysis in Section 4 thus provides only a preliminary indication of

trade flows that are subject to environmental measures. Neither does this section assess the *quantitative* impact of these measures on trade volumes, market access and competitiveness of developing countries' exports in Northern markets. In general, the following observations may be made on the impact of different types of environmental measures:

Economic policy instruments aim to internalise (part of) the environmental damage costs or risks caused by the production, distribution and/or consumption of a product. A common instrument is a charge based on some negative environmental aspect of a product (eg, on the sulphur content of fuels). This raises its selling price above its market level; the revenues of a charge may be used ('earmarked') for special purposes or they may flow to the general budget.

Deposit-refund schemes are most common for packaging materials, for example glass bottles. The consumer pays a deposit for a bottle, which is refunded if the bottle is returned to a specified location. There have been trade disputes on deposit-refund schemes because, it has been argued, in certain cases imported products have faced a competitive disadvantage vis-à-vis domestic products because of higher costs of establishing a collection system for foreign producers (eg, because of scale effects).

Technical regulations and standards prescribe certain product characteristics or PPMs for a product. If the regulations or standards are compulsory, market access depends on the product meeting the standard or regulation. Voluntary standards do not directly restrict market access, but they do try to give products which meet the standards a better place in the market. Voluntary eco-labelling schemes are intended to differentiate between products on the basis of their environmental performance. If consumers have a clear preference for the most environment-friendly products, they may fetch a premium in the market. From a trade perspective, technical regulations and standards may thus directly limit market access of imported products and/or increase production costs of the exporter to meet the standards, or they may influence the selling price of the product (upwards or downwards). As with economic instruments, technical regulations and standards can be directed towards product characteristics or PPMs or both.

Quantity import control measures directly affect market access of imported products. As quantitative restrictions create scarcity, they create so-called **scarcity rents**.

From a trade perspective it is interesting to ascertain to whom these rents accrue. This may be a state agency in the importing country if that agency uses the import licence itself or sells it to private parties. The rents may accrue to private entrepreneurs if the licences are distributed freely or sold under their market value. They may even accrue to the exporting country if the quotas have the form of so-called Voluntary Export Restraints (VERs). Finally, in the case of total prohibition of the import of a product, rents may accrue to illegal traders, eg, in the case of the illegal trade in endangered species of wildlife. The impact on exporters thus depends on the way the quantity import control measures are implemented.

From an environmental perspective it is interesting to ascertain how these scarcity rents are used. This could include environmental improvements of the imported products or their production processes. This is unlikely to happen, however, unless the import control measures are complemented by policies directly aimed at environmental improvement.

FIEM and CIEM

For a descriptive analysis of the extent to which southern exports are subject to environmental measures, two indices have been developed and are discussed in this section.

The first index measures the frequency of incidence of developing countries' exports subject to environmental measures, and termed the Frequency Index of Environmental Measures (FIEM). The FIEM is the *ratio* of HS tariff lines (at the 6 digit level) from a developing country subject to at least one environmental measure and the total number of HS tariff lines imported from that country. An example may clarify the concept. In 1992 the EU imported 278 different products from Zimbabwe of which 81 were subject to some environmental import measure. The FIEM in this case is 81/278 - ie 0.29.

The second index measures the coverage of developing countries' exports subject to environmental measures, and is termed the Coverage Index of Environmental Measures (CIEM). CIEM is the ratio of the *value* of the HS tariff lines from a developing country subject to at least one environmental measure and the total *value* of HS tariff lines imported from that country. Following the previous example, the EU imported US$642 million worth of goods from Zimbabwe of which imports subject to environmental measures totalled US$40 million. Thus the CIEM is 40/642 - ie 0.06.

FIEM and CIEM may also be calculated for groups of importing and exporting countries. The importing region could be the OECD region, European countries, or any other group of developed countries. The group of developing countries could include all or African or Asian developing countries or any other group. To calculate the FIEM for trade between groups of countries, HS tariff lines from/to different countries should be treated as different products. Thus, for the calculation of FIEM product/country *combinations* should be counted instead of products. The formula for the calculation of CIEM does not change when aggregated over groups of countries.

For these simple indices, the same qualifications apply as for most other measures that attempt to quantify tariff and non-tariff protection (Verbruggen, 1989). The FIEM measures the frequency of incidence of environmental measures affecting trade, not the volume or the value of the affected trade. CIEM measures the value of trade that is affected by environmental measures, but does not measure the *impact* of the measures on the trade volume. Consequently it does not measure whether the environmental measures act as *barriers* to trade. In fact, CIEM implicitly gives high trade barriers small weights. This can be explained thus: in the extreme case, the trade barrier is prohibitive, and no imports occur. CIEM gives this trade barrier a zero weight, because the **value of trade** is zero. CIEM therefore **over**represents broad measures with little or no trade impact, and **under**represents measures with large negative trade impacts.

It should be noted that the FIEM and CIEM indices only apply to restrictions on **imports** from developing countries into developed country markets. The indices do not apply to environmental restrictions on the **exports** of developed countries to developing countries, for example restrictions on the exports of waste paper or metal scrap, that can also affect developing countries (see, for example, van Beukering and Duraiappah, 1996). Furthermore, FIEM and CIEM relate explicitly to environmental product measures and not to non-product related environmental measures that may be imposed on developing country producers as part of an international environmental agreement or otherwise.

Descriptive Analysis

In this section the FIEM and CIEM are calculated for exports from developing countries to the EU market. At the time of calculation GREENTRADE did not include a full description of trade-related environmental measures of all EU member states, although it did contain descriptions of German measures. Thus, the calculations take the German trade-related environmental measures as representative of the entire EU. The FIEM and CIEM thus calculated are therefore hypothetical - they indicate what the frequency of incidence and the coverage of environmental measures would be in the EU, if all member states established the same measures as Germany. Since Germany is widely considered to have the most progressive environmental legislation in Europe, this could be taken as an indication of the future environmental legislation of the EU. In this sense, the FIEM and CIEM presented in the tables below may give an indication of the future FIEM and CIEM for the entire EU market. However, as the main purpose of this paper is to develop a practical *methodology* for quantifying the extent of trade-related environmental measures in developed country markets, the somewhat hypothetical nature of the calculations is only a slight drawback. Because of the on-going development of the GREENTRADE database, future calculations can be more realistic, and we strongly recommend this along the lines outlined in this paper.

Table 2 presents the hypothetical FIEM and CIEM for exports from developing countries to the EU market in 1992 for the three types of environmental measures identified in Table 1, and for all measures taken together. The FIEM and CIEM are calculated for exports from Africa, Asia, Latin America separately, all developing countries together, and for nine selected developing countries.

Table 2. Hypothetical frequency and coverage indices of exports from developing countries to the EU market subject to three types of environmental measures (1992**)**

Country/Region	**All environmental measures**		**Economic instruments**		**Standards & regulations**		**Quotas**	
	FIEM	CIEM	FIEM	CIEM	FIEM	CIEM	FIEM	CIEM
Africa	0.20	0.17	0.02	0.08	0.18	0.09	0	0
Asia	0.24	0.23	0.01	0.02	0.23	0.21	0	0
Latin America	0.16	0.08	0.01	0.03	0.15	0.04	0	0
All dev countries	0.23	0.20	0.01	0.04	0.21	0.16	0	0
Zimbabwe	0.29	0.06	0.01	0.00	0.28	0.06	0	0
Kenya	0.09	0.03	0.01	0.00	0.08	0.03	0	0
Philippines	0.29	0.29	0.01	0.01	0.28	0.28	0	0
India	0.20	0.29	0.01	0.02	0.19	0.27	0	0
Thailand	0.23	0.18	0.01	0.01	0.22	0.17	0	0
China	0.19	0.28	0.01	0.02	0.18	0.26	0	0
Brazil	0.17	0.09	0.01	0.03	0.16	0.06	0	0
Argentina	0.11	0.02	0.01	0.02	0.10	0.01	0	0
Colombia	0.25	0.24	0.02	0.22	0.24	0.02	0	0

Note: for sources and explanation of symbols, see annex 1

Table 3 presents the separate hypothetical FIEM and CIEM for the exports in 1992 to the EU market of commodities and manufactures, respectively.

Table 3. Hypothetical frequency and coverage indices of two types of export products from developing countries to the EU market subject to environmental measures (1992***)***

Country/Region	**All products**		**Commodities**		**Manufactures**	
	FIEM	CIEM	FIEM	CIEM	FIEM	CIEM
Africa	0.20	0.17	0.01	0.09	0.19	0.08
Asia	0.24	0.23	0.01	0.02	0.23	0.21
Latin America	0.16	0.08	0.01	0.03	0.15	0.05
All dev. countries	0.23	0.20	0.01	0.04	0.22	0.16
Zimbabwe	0.29	0.06	0.0	0.0	0.29	0.06
Kenya	0.09	0.03	0.0	0.0	0.09	0.03
Philippines	0.29	0.29	0.01	0.01	0.28	0.28
India	0.20	0.29	0.01	0.02	0.19	0.27
Thailand	0.23	0.18	0.0	0.0	0.23	0.18
China	0.19	0.28	0.01	0.01	0.18	0.27
Brazil	0.17	0.09	0.01	0.01	0.16	0.08
Argentina	0.11	0.02	0.01	0.01	0.10	0.01
Colombia	0.25	0.24	0.01	0.22	0.24	0.02

Note: for sources and explanation of symbols, see annex 1

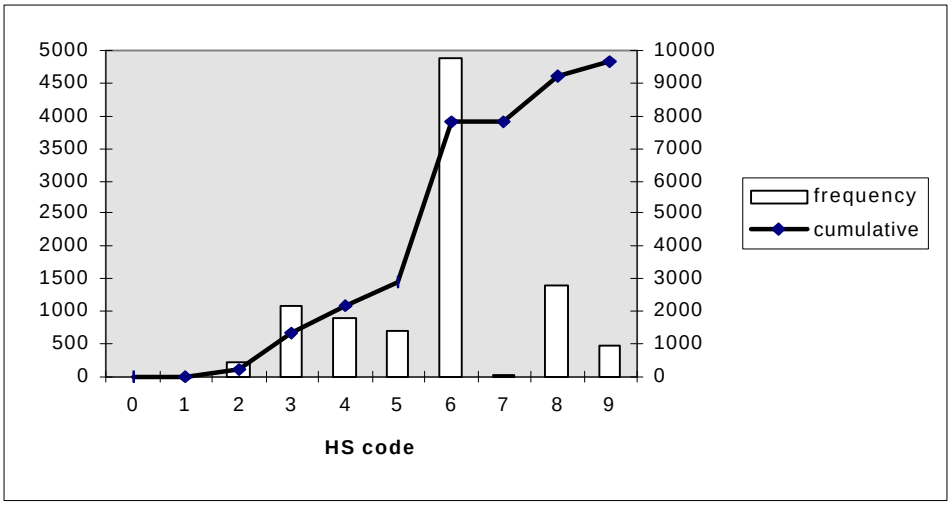
Table 4 present hypothetical FIEM and CIEM for the imports of all developing countries into the EU per major HS product group.

Table 4. Hypothetical frequency and coverage indices of major product groups from all developing countries to the EU market subject to environmental measures (1992)

HS	**Description**	**FIEM**	**CIEM**
0	Food and life animals	0.00	0.00
1	Cereals, food products, mineral oils, gum	0.00	0.00
2	Beverages, tobacco, minerals and ores	0.07	0.10
3	Pharmaceutical and chemical products	0.40	0.56
4	Rubber, hide and skins, leather, wood, paper	0.26	0.20
5	Silk, wool, cotton, fibres	0.18	0.23
6	Clothing, garments, shoes, stone, ceramic	0.80	0.83
7	Iron and steel, metal products	0.01	0.00
8	Machinery and tools	0.13	0.11
9	Miscellaneous consumer products	0.10	0.20

Figure 1 presents the frequency distribution and the cumulative distribution of trade-related environmental measures per major HS product group.

Figure 1. Frequency distribution and cumulative distribution of imported products from developing countries subject to trade-related environmental measures per major product group (1992**).**



Annex 2 provides specific information on all trade-related environmental measures in 1992 in Germany contained in the GREENTRADE database.

If German trade-related environmental measures existed throughout the EU in 1992, about one-fifth of all imports from developing countries would have been affected. This is a substantial proportion. Table 2 shows differences among regions and countries, where FIEM and CIEM are above-average for Asia and below-average for Latin America. These differences reflect the composition of exports among regions and countries. As Table 4 and Figure 1 illustrate, the trade-related environmental measures are largely targeted at textiles and clothing (HS 6); the key environmental policy measures in this area are the German textile labelling law and the prohibition on the use of certain dyes. These laws disproportionately affect Asia's exports to the EU which are comprised mainly of textiles and clothing.

In Table 4, FIEM and CIEM are zero for agricultural products (HS 0 and HS 1). This can be explained by the fact that the GREENTRADE database does not include food safety measures as environmental measures. This issue is discussed further in Section 6 below.

Although the FIEM and CIEM for developing countries as a group do not differ much (0.23 and 0.20), there is some variation between regions and between countries. For seven countries the FIEM exceeds CIEM, while the opposite is true for two countries (India and China). At the regional level FIEM exceeds CIEM marginally for Asia and Africa, while FIEM exceeds CIEM significantly for Latin America. It is too early yet to conclude from these differences that trade-related environmental measures negatively impact on the volume of trade in affected products. More research is necessary to test alternative hypotheses, such as price differences, long-term contracts, futures markets, and quotas, and to explain the different positions of India and China.

The type of instruments employed is predominantly standards and regulations (94%). While economic instruments only affect 6 percent of the number of products imported, in value terms, however, they affect 20 percent of the volume of imports. This indicates that economic instruments are used for relatively large import flows. The figures for Colombia illustrate this: although only 2 percent of all exported products are affected by economic instruments, this represents 22 percent of the value of exports (Table 2). This is due mainly to a consumer tax on bituminous coal (HS 270112) from Colombia. As yet, no environmental quota have been identified by GREENTRADE.

Table 3 shows that most trade-related environmental measures are directed towards manufactures rather than commodities (96% versus 4%). In value terms the situation is less extreme: 80 percent manufactures versus 20 percent commodities. These numbers suggest a close link between commodities and economic instruments, which is confirmed by a closer inspection of the data. Colombia is again a perfect illustration: although only 4 percent of all products are affected, this represents a value of 92 percent of the total value of exports to the EU affected.

Table 4 shows that the trade-related environmental measures are concentrated in HS product groups 3 and 6, both in number and value of products affected. In product group 3, 40 percent of the products are affected by environmental measures, representing a value of 56 percent of the total imports of this product group. In product group 6, 80 percent of the products are affected, representing 83 percent of the value of imports.

In absolute terms, the largest numbers of affected products are in product groups 6, 8 and 3, as can be seen in Figure 1. The difference between Table 4 and Figure 1 is due to the fact that the number of products in different product groups varies significantly.

The FIEM and CIEM indicate that a relatively large proportion of exports from developing countries to the EU might be affected by environmental measures. FIEM and CIEM do not, however, indicate the impacts of these measures on the costs for exporters or on market access in general. In the next section, the results of a small survey among Zimbabwean firms is presented to shed more light on the issue of market access.

Impacts of Trade-Related Environmental Measures on Exporting Firms: The Case of Zimbabwe

Introduction

The frequency of incidence and the coverage of trade-related environmental measures in terms of the value of the affected imported products was calculated in the previous section. But to what extent do the environmental measures of the EU increase the costs for exporters in developing countries? do they reduce trade? and to what extent are they barriers to trade?

The question whether stricter environmental regulations in developed countries lead to higher costs for exporters in developing countries and reduce the volume of trade, has been examined in a series of country case studies under the UNCTAD/UNDP programme "Reconciliation of Environmental and Trade Policies"[3] On the basis of nine such studies[4], Markandya (1995) concludes that the effects are mixed. Many of the larger exporting countries claim that the effects have been small and manageable. In several cases the adoption of stricter standards did not only reduce environmental damage, but also improved efficiency and profits. On the other hand, negative impacts could also be identified; smaller producers particularly were reported to be facing difficulties in complying with an increasing number and variety of regulations, not least because it is costly and difficult to be kept informed of regulatory changes. In some cases regulations were found to be "cumbersome, complex and at least partly designed to make exports uncompetitive" (Markandya, 1995:p 13). In some cases, compliance costs were reported to have negatively affected exports. Markandya argues that this is particularly true for Zimbabwe (Markandya, 1995:13).

In the current CREED study, a survey among Zimbabwean manufacturing firms was undertaken in order to investigate whether EU environmental regulations negatively affect exporters, by increasing their costs or otherwise. Limiting the study to one country means that the results cannot be considered representative. Nevertheless, Zimbabwe presents an interesting case because of the claim by Markandya.

[3] For a description of this programme, see UNCTAD 1993.
[4] Brazil, China, Colombia, India, Philippines, Poland, Thailand, Turkey and Zimbabwe.

Selection and composition of sample

During 1993 a survey was undertaken among 200 industrial firms in Zimbabwe. It included questions on the incidence and impacts of environmental trade barriers in the EU market[5]. The survey was limited to manufacturing firms in the following sectors: food processing, woodwork and furniture, textile garments (including leather and footwear), and metalwork Firms in the sample should have a minimum of five employees in 1993 (including the owner managers) and be able to make their own investment decisions, thereby excluding totally dependent subsidiaries. The sample was selected so that each worker in each of the seven sectors had an equal chance of being sampled. Although this design favoured larger firms, the sampling was undertaken in a way that allowed correction for the underepresentation of smaller firms, thus ensuring generalisations from the survey results. See Gunning (1994) for a further description of the sample selection. The interviews with the (owner-)managers of the firms were conducted by a team of two enumerators, one of whom was a Zimbabwean. The interviews lasted an average of one-and-a-half (small firms) to three hours (large firms).

Of the sample of 200 firms, 188 useful observations could be retained. Of these 188 firms, 91 firms exported part of their production. 32 firms exported to the European market. The mean exporting firm was significantly larger than the non-exporting firm, both in terms of employment (475 versus 152 employees) and output (Z$67m. against Z$18m.). Exporting firms were equally distributed across all sectors as shown in Table 5 and were mainly located in Zimbabwe's two largest urban centres, Harare and Bulawayo.

Table 5 Composition of sample and exporting firms by sector

	Food %	**Wood %**	**Furniture %**	**Textiles %**	**Garment %**	**Metal %**	**Leather %**	**No. of obs.**
Entire sample	24	5	9	11	28	18	6	188
Exporting firms	20	2	10	13	27	20	6	91
Exporting to Europe	6	6	3	16	53	6	9	32

Firms exporting to the European market are concentrated in the textile and garment sectors (Table 5), which have a significantly lower output per employee than other exporting firms. This indicates that in manufactures Zimbabwe's comparative advantage vis-à-vis Europe lies in labour-intensive products.

[5] The survey was conducted by the Vrije Universiteit (Economic and Social Institute) and the University of Zimbabwe (Economics Department) within the framework of the Regional Programme of Enterprise Development initiative sponsored by the World Bank and a group of European donors. The opportunity was given to CREED to include a few questions to the questionnaire, for which we thank the executing organisations and the sponsors.

Results

When asked whether EU environmental regulations were a barrier to exports, thirteen firms answered in the affirmative. Of these thirteen firms, five exported to Europe (four exported garments and one exported shoes), five exported to other countries and three did not export at all. The exporting firms that did not export to Europe were concentrated in the food market. They complained about EU sanitary and phytosanitary regulations; a complaint that was also mentioned in the UNCTAD/UNDP country case studies[6]. Note, however, that sanitary and phytosanitary regulations are usually not classified as environmental regulations; they are also not classified as environmental regulations by GREENTRADE.

Although thirteen firms considered EU environmental regulations as trade barriers, only three firms had experienced a market decline in the EU over the previous three years. In these cases the major cause was cited as fierce competition rather than environmental regulations. None of the firms had invested in equipment as a result of environmental regulations in the export market; the response to environmental measures ranged from quality assurance, changes in packaging, and minor product modifications (eg, not using nylon buttons). Garment exporters are subject to environmental regulations that prohibit the use of certain chemicals and processes. Interviews with garment manufacturers revealed, however, that correctly dyed fabrics could be obtained easily at marginally higher costs, which could often be passed on to the importer.

The firms that exported to Europe obtained information about product regulations from a limited number of sources (Table 6), the most important being the EU customer (importer), who offered the specifications for the product. An important role is also played by Zimtrade, Zimbabwe's organisation of exporters; many firms indicated that they had received useful information from this organisation. Own research in the form of reading journals and visiting trade fairs also played a role in obtaining information on product regulations.

Table 6 Sources of information on product regulations

Source of information	**Observations**
Customers	16
Zimtrade	6
Own research	4
Parent company	2
Other	4
Total	32

[6] An example is the export of ostrich meat. According to Nkomo et al. (1995), no ostrich meat may be exported to the EU because Zimbabwe does not yet posses an abattoir certified by the EU. Nkomo et al. claim that certification requirements are unclear. It is also ambiguous whether trade in ostriches should be subject to regulations applying to poultry or to wildlife (Nkomo, 1995:9).

A special role is played by multinational companies. The sample included a number of firms that were owned by a multinational company. These firms did not export to Europe (a market usually covered by the mother company), but their product standards are usually higher than required by Zimbabwean or even European law. These standards are set by the parent company and hold uniformly for all national daughter companies. Firms that are part of a multinational organisation therefore have an advantage in terms of information and knowledge in complying with foreign product standards.

Evaluation of the results

While the Zimbabwean were concerned about environmental trade barriers, there is little actual evidence to warrant their anxiety. On the one hand, 13 firms out of a total of 188 firms (of which 92 were exporting firms) reported that EU environmental regulations constituted barriers to trade. However, a number of firms addressed EU sanitary and phytosanitary measures which are, in line with common practice, not considered environmental measures in this study. On the other hand, the survey did not identify any firms that had experienced a decline in exports to the EU market because of stricter regulations. In fact, the responses to environmental regulations were minor. The survey therefore does not confirm Markandya's claim that compliance costs of environmental regulations negatively affect exports, particularly of Zimbabwe (Markandya, 1995: 13). Where, for example, Markandya reports a potential costly change in processing technology of garments due to regulations prohibiting certain dyes and processes, our survey found that the costs of meeting this regulation proved to be only marginal, and could often be passed on to the importer. This again suggests that there is more anxiety about emerging environmental regulations in consumer markets than is presently justified, at least in manufacturing.

Conclusions and Recommendations

A large and probably growing number of products from developing countries are subject to environmental measures in Northern markets. These environmental measures include economic instruments, technical regulations and standards and quantity import controls. This study has illustrated that a quantification of the frequency of incidence and of the coverage in terms of value of the affected imports is possible on the basis of public trade information and the GREENTRADE database developed by UNCTAD. Two simple indices have been developed for this purpose: the Frequency Index of Environmental Measures (FIEM) and the Coverage Index of Environmental Measures (CIEM).

A hypothetical calculation of FIEM and CIEM in the EU, assuming that all countries would use German environmental measures, showed that one-fifth of all products from developing countries would be subject to environmental measures. The majority of products would face technical regulations and standards, and a minor share would be subject to economic instruments. The major share of environmental measures is directed towards textiles and clothing, thus explaining that FIEMs and CIEMs for imports from Asian countries are higher than for imports from Latin American countries, with African countries occupying a middle position. A comparison between FIEMs and CIEMs for manufactures and commodities revealed that a large proportion of environmental measures is directed at manufactures. The data suggest a link between type of instrument and type of product: economic instruments for commodities, technical standards and regulations for manufactures.

As to the impacts of environmental measures on the competitiveness and market access of developing countries exporters, a small survey among Zimbabwean exporters (n=91) produced mixed results. On the one hand, 13 firms considered EU environmental regulations to be barriers to trade. On the other hand, no specific evidence for this claim was revealed - only minor responses were reported as a result of environmental regulations. The major sources of information for the firms on environmental regulations in their export markets were their foreign customers and Zimtrade, Zimbabwe's organisation of exporters.

Nevertheless, as the number and complexity of environmental measures in Northern markets is still increasing, it is worthwhile continuing to monitor these measures and to investigate their impacts. The GREENTRADE database is a very useful tool for information on trade-related environmental measures in international commerce. It would, however, also be very useful if aggregate statistics, such as the FIEM and CIEM developed in this paper, would be calculated and published by an (international) statistical agency on a regular basis. Such statistics and particularly their development over time would be very useful for both scientific and policy purposes.

In the international debate on trade and environment, an important distinction is made between environmental measures that are based on the characteristics of a product and measures that are based on aspects of its production (PPM measures). It would be very useful if the GREENTRADE database could classify trade-related environmental measures with respect to their PPM content. However, this will not be easy since some arbitrary judgement will be unavoidable. If such a classification were made, FIEM and CIEM could also be calculated separately for PPM and non-PPM measures.

The FIEM and CIEM indices, developed in this paper, do not address environmental restrictions on the exports of developed countries. It is recommended that a study is undertaken to investigate the possibilities and usefulness of developing separate indicators to address this issue or to integrate export-related measures in the current framework of indices.

Our study also encountered some confusion about the exact definition of environmental measures. Some studies include measures on food safety while other studies (including the GREENTRADE database) do not. Developing country exporters will be indifferent to whether measures affecting their products are motivated by environmental or consumer safety concerns; indeed, it could perhaps even be argued that food safety measures are a type of environmental measure. However, there should be clarity on definitions. This is a *conditio sine qua non* for analytical clarity and for transparency of the policy debate on this issue.

Finally, we recommend further and intensive case-study research into the actual social, economic and environmental impacts in developing countries of specific trade-related environmental measures. Examples of important research areas include the differential impacts of 'Voluntary' and 'Compulsory' standards in international commerce, and the impacts of packaging regulations and other measures on employment in developing countries.

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Annex 1

Explanation of symbols

n.a. not available
FIEM Frequency Index of Environmental Measures
CIEM Coverage Index of Environmental Measures

Product groups affected by German environmental measures in 1992

HS-code (2-digit)	Description	Affected tariff lines
25	Salt, sulpher, earth & stone, plastering material, lime & cement	2524 (asbestos)
27	Mineral fuels, oils, etc.	2701, 271000, 270600, 270710
29	Organic chemicals	290220, 2903, 2904, 290810, 291211, 292144, 2932, 2933
30	Pharmaceutical products	3003, 300590
31	Fertilisers	3101, 3102, 3103, 3104, 3105
32	Tanning and dyeing extracts, etc.	320419, 3208, 3209, 321000, 3211, 321290, 3213
33	Essential oils & resinoids, perfumes, etc.	3303, 330430, 3305, 3306, 330710
34	Soap, organic-surface active agents, etc.	3401, 3402, 3403, 340510
38	Miscellaneous chemical products	380700, 3808, 380910 381400, 382390
39	Plastics, plastic articles	3903, 390410, 3909, 391721, 3920, 3921, 392290, 3923, 3924, 3925, 3926
40	Rubber, rubber articles	401210
44	Wood, articles of wood	440310, 440721, 440820, 44101, 441211, 4415, 4418
45	Cork, articles of cork	4503, 4504
47	Pulp of wood or of other fibrous cellulosic material, etc	4707
48	Paper and paperboard, articles of paper pulp, etc.	48
57	Carpets and other textile floor coverings	57
58	Special woven fabrics, lace, tapestries, etc.	58
59	Impregnated, coated, cover/laminated textile fabrics	59
60	Knitted or crochetted fabrics	60
61	Articles of apparel and clothing access; knitted or crochetted	61

62	Articles of apparel and clothing access; not knitted or crochetted	62
68	Articles of stone, plaster, cement, asbestos, mica, etc	6808, 6809, 6810, 6811, 6812, 6813
70	Glass and glassware	7008, 701090
76	Aluminium, aluminium articles	761290
82	Tools, implements, cutlery etc. of base metal	822410
83	Miscellaneous articles of base metal	8309, 831130
84	Nuclear reactors, boilers, machinery and mechanical appliances	840211, 840310, 840410, 841370, 8415, 841610, 8418, 8419, 842211, 8424, 843311, 844250, 845011, 845150, 847010, 847989
85	Electrical machinery and equipment, parts	8506, 8516, 85231, 85242, 853931, 854140
86	Railway and tramway locomotives and other rolling-stock	8603, 8605, 8606, 8609
87	Other vehicles	8701, 8702, 8703, 8704, 8705, 8706, 8707, 870831 8709, 8710, 8711, 8716
89	Ships, boats, floating structures	8901, 8902, 8903, 8907
91	Clocks and watches	910111, 910211
94	Furniture, bedding, mattresses, cushions, etc.	9401, 9403, 9404

Abbreviations and acronyms

CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
GATT/WTO	General Agreement on Tariffs and Trade/World Trade Organisation
HS	Harmonised System
PPM	Process and Production Method
TCMs	Trade Control Measures
TRAINS	Trade Information System
TREM	Trade-Related Environmental Measure
UNCTAD	United Nations Conference on Trade and Development
UNDP	United Nations Development Program
UNEP	United Nations Environment Program
VER	Voluntary Export Restraint

***Sources*:**
Trade data have been obtained from TRAINS, version 2.0 A (1994)

Annex 2 German trade-related environmental measures 1992 (source GREENTRADE)

Product Standards (D.1.5.)

Product	Source	Date	Remarks
Light fuel oil and diesel fuel	BGBI III 2129-8-1-3.Ordinance, on sulphur in fuels (A.p.28, B.p.108).	12/87	The sulphur content in light fuel oil should not exceed 0.3% by weight and in diesel fuel 0.2% . Exemptions are granted by the relevant authorities. Data reporting and information requirements are imposed on producers, importers & wholesalers.
Detergents and cleansing (see also formaldehyde)	BGBI III 783-8 Act on washing & cleaning agents BGBI III 8053-65. Ordinance on surfactants & on dangerous substances. (A.p.28, B.p.113)	01/77 03/87 09/91	Establishment of rules for the biodegradation and elimination of organic substances and surfactants used in detergents and cleaners. Requires that tensids have to be at least 90% degradable. Prescribes certain limits for phosphates used in detergents. The limit for **formaldehyde** is 0.2% by weight.
Insulating materials	-(A.p.29)	-	The building regulation of the various federal states require that insulating materials must prove their usefulness.
Weight-loading wood-frame constructions (see also wood preservatives)	-(A.p.29)	-	The building regulation of the various federal states require that weight-loading wood-frame constructions must be protected with chemical **wood preservatives**. Their usefulness must be certified.
Particle boards used for furniture	-(A.p.29)	-	Should not emit more than 0.01 ppm **formaldehyde** in a defined test.
Waste oil	-(A.p.29)	11/87	Oils in which the proportion of PCBs exceeds 20 mg/k or in which more than 2 g/k halogens are contained must be excluded from reprocessing and be incinerated. Exception may be made if PCB can be destroyed during processing by use of new methods.
Prohibitions (D.I.1)			
Wood preservatives (containing creosote, arsenic and mercury compounds and mixtures)	Ordinance on creosote. BGBI III 8053-6-16 (B.p.112)	05/91	The prohibition concerns the manufacture, placing at disposal and use of wood preservatives containing **creosote** (HS: 27079100, 38070090) **or mixtures with creosote**, the placing at disposal and use of products containing wooden parts treated with such preservatives. Exemptions are granted by the relevant authorities, provided that these products are not intended for private consumption. The prohibition concerns also for wood preservatives containing **arsenic** (HS:280480), **compounds and mixtures** and for **mercury compounds and mixtures** (HS: 28054010, 28054090, 28259050, 28332970, 28342930) contained in wood preservatives.
DDT	DDT- Act. BGBI III 2121-9 (A.p.13, B.p.101)	08/72	The prohibition concerns the manufacture, export, import, placing at disposal, acquisition and use of DDT, and products produced by means of DDT.
Antifouling paints (containing compounds and mixtures of: arsenic, mercury, organic tin and 1,2,3,4,5,6, hexa-clorocyclohexano).	Chemicals Act GefStoffV, A.V. BGBI III 8053-65 Ordinance on dangerous substances 09/91 (A.p.13, B.p.103)	07/80	The prohibition concerns for antifouling paints containing compounds and mixtures of the following products: **-arsenic** (HS: 280480), **-mercury** (HS:28054010, 28054090, 28259020, 28332970, 28342930), **-organic tin** (HS:294200), **-1,2,3,4,5,6, hexaclorocyclohexano** (HS: 290351).
Benzene (see benzol)	GefStoffV, A.II BGBI III 8053 -65 Ordinance on dangerous substances 09/91 (A.p.13, B.p.102)	07/80	The prohibition applies to benzene and to mixtures containing more than 0.1% of benzene.

Carbon tetrachloride, Tetrachloroethane, Pentachloroethane	GefStoffV, A.III BGBI III 8053-6-15 Ordinance on chlorine aliphatic compounds 04/91 (A.p.13, B.p.99)	07/80	The prohibition concerns the placing at disposal and use for private consumption. Applies to tetrachloroethane, and 1,1,1,2-tetrachloroethane, pentachloroethane, to their compounds and products to which the specified substances have been added as solvents, to compounds and products containing more than 0.01% of the specified substances.
Pentachlorophenol (PCP)	PCP-Decree BGBI III 8053-67 (A.p.13, B.p.99)	12/89	The prohibitions concern production, placing on the market and use. Applies to PCP, pentachlorophenol sodium, all pentachlorophenol salts and compounds and mixtures containing more than 0.01% of the specified substances , and to products containing more than 5 mg/k after treatment with specified substances.
Vinyl Chloride (chloroethylene)	BGBI III 8053-66 Ordinance on PCB, PCT and vinyl chloride (A.p.13, B.p.99)	07/89	The prohibition concerns production, placing on the market and use.
Benzol (see benzene)	2. Amendment of GefStoffV Art.9 (A.p.13)	04/89	The prohibition concerns placing on the market and use
Benzidine	2. Amendment GefStoffV Art.9 BGBI III 8053-65 Ordinance on dangerous substances 09/91 (A.p.13, B.p.103)	04/89	The prohibition concerns production, placing on the market and use. Any mixtures containing benzidine and its salts must be labelled "for commercial users only".
2-nafhthylamin	2. Amendment GefStoffV Art.9 BGBI III 8053-65 Ordinance on dangerous substances 09/91 (A.p.13, B.p.102)	04/89	The prohibition concerns production, placing on the market and use. Any mixtures containing 2-naphthylamine and its salts must be labelled "for commercial users only".
4-Nitrodiphenil	2. Amendment GefStoffV Art.9 BGBI III8053-65 Ordinance on dangerous substances 09/91 (A.p.13, B.p.103)	04/89	The prohibition concerns production, placing on the market and use. Any mixtures containing 4-nitrodiphenyl must be labelled "for commercial users only".
Dioxines, furanes	GefStoffV Art.9 BGBI III 8053-65 Ordinance on dangerous substances 09/91 (A.p.13, B.p.102)	08/86	The prohibition concerns placing on the market. A limit value (0.005 mg/k) concerns substances mixtures and products containing certain dioxines. for 2,3,7,8-tetrachlorodibenzo-p-dioxine, a limit value of 0.002 mg/k applies.
PCBs (polychlorinated biphenyl)	BGBI III 8053-66. Ordinance on PCB, PCT and vinyl chloride (A.p.13, B.p.99)	07/89	The prohibition concerns the manufacture, placing at disposal and use. Applies also to mixtures containing more than 50 mg/k PCB, products containing PCBs or mixtures, and mixtures and products suspected of belonging to these categories.
PCTs (polychlorinated terphenyls)	BGBI III 8053-66. Ordinance on PCB, PCT and vinyl chloride (A.p.13, B.p.99)	07/89	The prohibitions concerns the manufacture, placing at disposal and use. Applies also to mixtures containing more than 50 mg/k PCT, products containing the PCTs or mixtures, and mixtures and products suspected of belonging to these categories.
DDB ?			
Taroils	Taroil Decree (A.p.14)	05/91	The prohibition concerns production, placing on the market and use.
Asbestos (contained in certain substances, mixtures and products)	(B.p.101)GefStoffV Art 9 Annex III. and BGBI 8053-6-5 ordinance on dangerous substances 09/91	08/86	The prohibition concerns asbestos contained in the following substances mixtures and products: **Toys (HS:9501-9503), powdery finished products not intended for commercial use, tobacco products such as pipes, cigarette and cigar holders (HS:9614), catalytic screens and insulation material for or in hydraulic heating systems, coating material, paints and varnishes (HS:3208-3211, 3213), substances or mixtures used for spray processes and, crocidolite or mixtures of products containing crocidolite.**

Formaldehyde (methanal)	Art.9 GefStoffV BGBI III 8053-65 Ordinance on dangerous substances 09/91 (A.p.13, A.p.29, B.p.113)	08/86	The prohibition concerns placing on the market of **wood materials, washing, cleansing and preservative agents, plus hygiene products** containing formaldehyde (threshold limits)
Paints and varnishes containing lead (lead carbonate, lead hidrocarbonate, lead sulphate) and/or asbestos (see also asbestos)	BGBI III 8053-6-5 Ordinance on dangerous substances 09/91 (A.p.13, B.p144)	07/80	The prohibition is applied to paints containing lead: (lead carbonate- HS 283670, Lead fidrocarbinate and. lead sulphate- HS 28332970). The prohibition concerns the use for interior paint work. Paints used for the restoration of paintings and buildings are exempt.
CFCs,	CFC-Halons-prohibition Decree BGBI III 8053-6-17 (A.p.14 B.p.92)	05/91	Prohibition concerns production, placing on the market and use according to use purposes.
Halons	CFC-Halons-prohibition Decree BGBI III 8053-6-17 (A.p.14, B.p.92)	05/91	Prohibition concerns production, placing on the market and use according to use purposes.
Products containing CFCs and Halons	CFCs-Halons-prohibition Decree (A.p.14, B.p.92) and UNEP/OzL.Pro.4/3.	05/91	It should be noted that, the HS code numbers given (Annex D of Montreal Protocol) are for particular products which **may or may not contain** controlled substances. The numbers given should be used as a guide and further verification is needed to establish whether or not the products contain controlled substances. Prohibition concerns production, placing on the market and use according to use purposes. There are a **voluntary arrangements** on taking back and reuse of **CFCs** from **waste refrigerators and foamed insulating materials**. **Voluntary arrangements** for reduction of the use of **CFCs** in aerosols (1987) also exist; Phasing out of all **CFCs** covered by the Montreal Protocol (1990) and, Reduction of the use of **CFCs** as **propellant** (1975). (B.p.95/96).
1,1, 1-trichloroethane (methylchloroform) (Este es un Halon luego creo que es repeticion)	Chlorophate Decree BGBI III 8053-6-17 Ordinance on CFCs and Halons (A.p.14, B.p.100)	05/91	Prohibition concerns placing on the market for private consumers; use in non-commercial rooms.

Other regulatory instruments

-Take back obligations (D.I.7 & D.I.13)			
Waste oil (see also engine and gear oils)	Waste Oil Decree BGBI III 2129-15/17) (A.p.34,B.p.97)	11/87	Users are obliged to bring waste engine oil back to the competent bodies.
Solvents	Solvents Decree (A.p.34)	04/89	This Decree does not relate to halogenic solvents used in the domestic area.
Engine oil (see also waste oil)	Waste oil Decree (A.p.48)	11/87	Users are obliged to bring waste engine oil back to the competent bodies.
Gear oils (see also waste oil)	Waste oil Decree (A.p.48)	11/87	Users are obliged to bring waste transmission oil back to the competent bodies.

Packaging	Packaging Decree. BGBI III 2129-15-2 (A.p.34,B.p.96)	06/91	Manufacturers, distributors and retailers have organised a system to collect used packaging, material sorting and recycling, and have established a private firm called "Dual System Deutschland" (DSD). The task of this firm is to collect directly from consumers sales packaging which bear a "Green Dot". In addition to DSD, other firms also collect transport and other packaging. An additional waste bin or sack is used for this purpose. The system is financed through licensing fees paid by the producers for the use of the Green Dot on their sales packaging. The take-back obligation for one-way plastic packaging for beverages is coupled with a deposit requirement of DM 0.50 per bottle.
-User obligations			
Pesticides	Pesticide Act (A.p.48)	-	The Pesticide Act obliges producers or importers to provide instructions to users on the approved and proper use of pesticides
-Recycling/reuse quotas (D.I.10)			
Waste paper (graphic papers)	Waste Paper Decree (A.p.43, B.p.97)	-	Target recycling rates: -1993: 52% -1995: 55% -1997: 60% This recycling rate refers to the relation between all used graphic paper and the recycled paper.
Cars: waste of -Steel -NE-metals -Plastic -Glass -Tyres -Other elastometers	Waste cars Decree (A.p.43/44,B.p.97)	-	Reuse and recycling. Target recycling rates vary from 20% in 1996 to 100% in the year 2000 depending of the material. The recycling rate refers to the relation between all materials from taken back vehicles and the recycled materials. They are a form of informative targets and are not obligatory.
Packaging of -Plastic -Paper -Cardboard (paper) -Glass -Aluminium -Other metals -Compounds	Packaging Decree (A.p.43,B.p.97)	-	The Packaging Decree specifies a set of requirements with respect to collection and sorting rates which together determine recycling rates. The target recycling rates are between 6% in 1993 to 72% in the year 2000, depending of the material.

Economic Instruments

Product Charges and taxes (D.II.1 & D.II.2 & D.II.3)			
Mineral oils	-(A.p.54), and OECD 1994, Managing the environment: The role of economic instruments, p.72.	1985	A tax differentiation between leaded and lead free gasoline has been introduced: lead gasoline is taxed higher than lead free - gasoline. The taxes applied in DM in 1994 were: Leaded gasoline: 0.92/litre; unleaded 0.82 /litre; Automotive diesel 0.54/litre; Aviation fuel 0.57-0.65/litre; Light fuel oil: for households low lead 0.137/litre, for households high lead 0.150/litre, for industry low lead 0.080/litre, for industry high lead 0.093/litre; Heavy oils: for lubricant and clearings 532.5/t, for heating, gas oil 68.5/t, for heat generation 30/t, for electricity generation 55/t.

Motor vehicles	-(A.p.54)	1986	The tax rate in DM varies according to the category of the car and also according to whether otto or diesel engines are used. Tax exemption for a period of five years was introduced for electric cars licensed after July 1991.
Hard coal	-(A.p.58)	1975	The tax rate is fixed as a percentage of the bill on electricity and varies according to the federal states. In 1993, the average rate was 7.5% of consumer's electricity tariff.
Packaging	-(A.p.62)	-	In addition to national taxes and charges both the Lεnder and the local authorities may impose taxes in keeping with prescriptions of the German federal system **(regional product taxes and charges)**.
-Subsidies (D.II.4)			
Electric cars	(A.p.63/55)	07/91	Tax exemption for a period of five years has been introduced for electric cars.
Solar collectors/cells	Art. 82a Income Tax Decree. -(A.p.64)	-	Art. 82a of the Income Tax Decree permitted accelerated depreciation rates over a period of ten years for products which contribute to the conservation of energy
Heat pumps	Art. 82a Income Tax Decree. -(A.p.64)	-	Art. 82a of the Income Tax Decree permitted accelerated depreciation rates over a period of ten years for products which contribute to the conservation of energy
-Deposit-refund schemes (D.II.5)			
Packaging	-(A.p.66), OECD 1994, Managing the environment: The role of economic instruments, p.86.	-	An obligatory deposit for certain non returnable packaging must be introduced in the absence of a collection system for packaging waste. But because such a system has been established this prescription has not been applied. The compulsory deposits for packaging in the case of a missing collection system are: **beverage packaging** between 0.2 and 1.5 litre: 0.50 DM, beverage packaging >1.5 litre: at least 1.00 DM, **packaging of washing and cleaning agents** between 0.2 and 1.5 litre: 0.50 DM, packaging of washing and cleaning agents > 1.5 litre: at least 1.00DM and packaging of > 2 kg 2.00DM. Also a mandatory deposit for **packaging of dispersion paints** of ECU 0.9% of the price.

Information based instruments

-Compulsory labelling (D.III.1 & D.II.2)			
Hazardous Chemical products,]substances and preparations	Chemicals Act BGBI III 8053-6-5 Hazardous Substances Decree (A.p.79/95, B.p.92)	-	Compulsory labelling is applied to chemical products, substances and preparations which have been classified and which are not forbidden or otherwise regulated. Labelling must be categorised according to the nature of the hazard. The prescriptions for the labelling process, the labels which have to be used, the provision of information and symbols and the procedures are stipulated in the Hazardous Substances Decree. A voluntary agreement for export of hazardous chemicals exists(1986).
Textiles and clothing	(A.p.82, B, p.98)	-	The textile Labelling Law stipulates that all sorts of textiles can be offered for sale only if they are labelled with a declaration on the nature and weight of the raw materials used. This declaration must be presented in a manner that is clearly visible, readable and uniform. Industry meanwhile has plans to introduce its own, voluntary labelling systems. (consult Simonetta).

Lawn mowers	BGBI III 2129-8-82 Ordinance on noise from lawn mowers (A.p.82, B.p.109)	1987	Article 5 of the Lawnmowers Decree and also under EC regulation 84/538 lay down that producers and importers are obligated to attach a label (and a certificate) concerning noise emissions of every lawn mower: 96 dB relative to 1 pW for mowers with a cutting width of <50 cm, 100 dB relative to 1pW for mowers with a cutting width of 50-120 cm, and 120 dB relative to 1 pW for mowers with a cutting width > 120 cm.
Detergents and cleaners	BGBI III 783-8 Act on washing & cleaning agents, BGBI III 8053-6-5, Ordinance on dangerous substances (A.p.88/89, B.p.113/117)	03/87 09/91	A compulsory declaration of advice for the use and wasteage of the product exists. Producers and importers are obliged to provide information about the dosage in relation to the hardness of the water and the productivity of a detergent in relation to the amount of laundry. In 1990, industry committed itself voluntary to provide information on the packaging of relevant substances and active agent groups, in particular, and of the quantities used.
Pesticides	Pesticide Act -(A.p.88/89)	-	A compulsory declaration of the composition of the product and advice for the use and waste stage of products exists. The Pesticide Act obligates to provide additional information about the name of the product, admission number, agents by type of quantity, expiry date, and user obligations (see also pesticides in user obligations)
Fertilisers	-(A.p.89)	-	A compulsory declaration of the composition of the product exists. Fertilisers that correspond to an admitted type of fertilisers may only be sold if they are furnished with the following information: designation of type (quantity of substances), nature and quantity of nutritive substances, netweight in kg or, in the case of liquid substances, in litre or m3 and name and address of producer or importer. The information has to be in German and must be placed on the packing or container in a manner that is clearly visible.
Engine and drive oil	Waste Oil Decree -(A.p.89)	11/87	Engine and drive oils may be put on the market that are accompanied by information to consumers to bring waste oil to separate collection points, e.g., petrol stations. Users are obligated to return waste oil to collection points after use.
-Eco-labelling (D.IV.2 & D.IV.3)			
Plastic packaging			
Textile			
Other			

Public procurement (D.II.7)			
PVC	-(A.p.71/72)	-	Some local administrations have a number of issues which concretely detail the public procurement process. Local administrations, in particular, have developed check lists, questionnaires etc, for the examination of the procurement process. They are known as "Procurement-Environment Impact Assessment" or " Product-Environmental Impact Assessment". Some cities such as Bielefield, Dηsseldorf and Nηrnberg have voted in favour of prohibiting the procurement of special products and products which contain special substances which might harm the environment like PVC.
Tropical timber	-(A.p.71/72)	-	Some local administrations have a number of issues which concretely detail the public procurement process. Local administrations, in particular, have developed check lists, questionnaires etc, for examination of the procurement process. The are know as "Procurement-Environment Impact Assessment" or " Product-Environmental Impact Assessment". Some cities such as Bielefield, Dηsseldorf and Nηrnberg have voted in favour of prohibiting the procurement of special products and products which contain special substances which might harm the environment, like imports of Tropical Timber.
CFC's	-(A.p.71/72)	-	Some local administrations have a number of issues which concretely detail the public procurement process. Local administrations, in particular, have developed check lists, questionnaires etc, for the examination of the procurement process. They are known as "Procurement-Environmental Impact Assessment" or "Product-Environmental Impact Assessment". Some cities such as Bielefeld, Dηsseldorf and Nηrnberg have voted in favour of prohibiting the procurement of special products and products which contain special substances which might harm the environment, like CFC's.
Asbestos	-(A.p.72)	-	Some local administrations have a number of issues which concretely detail the public procurement process. Local administrations, in particular, have developed check lists, questionnaires etc, for the examination of the procurement process. They are known as "Procurement-Environmental Impact Assessment" or "Product-Environmental Impact Assessment". Some cities such as Bielefeld, Dιsseldorf and Nηrnberg have voted in favour of prohibiting the procurement of special products and products which might harm the environment, like asbestos.

-Eco-labelling (D.IV.2 & D.IV.3)

Retreaded tires	RAL-UZ 1	1978	
Returnable bottles	RAL-UZ 2	1978	
Low waste hairsprays, deodorants and shaving foams	RAL-UZ 3	1989	
Glass collection bin campaign	RAL-UZ 4	1978	
Sanitary crepe paper made from recycled paper	RAL-UZ 5	1978	
Low-noise lawn mowers	RAL-UZ 6	1978	
Low-emission oil-atomising burners	RAL-UZ 9	1979	
Asbestos-free brake linings	RAL-UZ 11	1980	
Low-pollutant coatings	RAL UZ 12A	1980	
Powder coating	RAL UZ 12B	1981	
Salt-free blunting spreading material	RAL UZ 13	1981	
Recycled paper	RAL-UZ 14	1981	
Zinc-air batteries	RAL-UZ 16	1981	
Potting containers and similar moulded parts made from recycled materials	RAL-UZ 17	1982	
Durable low-noise motor-car mufflers	RAL-UZ 19	1982	
Asbestos-free clutch linings	RAL-UZ 20	1982	
Sound proofed glass collection bins for noise-sensitive areas	RAL-UZ 21	1982	
Waste water-poor car-washing plants	RAL-UZ 23	1983	
Environmentally sound pipe cleansers	RAL-UZ 24	1983	
Reusable capsules for cream machines and soda siphons	RAL-UZ 25	1983	
Reusable crates for food products	RAL-UZ 26	1983	
Reusable packings for transportation	RAL-UZ 27	1984	
Reusable trays and similar industrial packings	RAL-UZ 28	1984	
Products made from recycled plastics	RAL-UZ 30a	1990	
Products made from waste rubber	RAL-UZ 30b	1990	
Motor vehicles with exhaust emission control	RAL-UZ 31	1984	
Water economising flushing cisterns	RAL-UZ 32	1984	
Electronically operated shower facilities	RAL-UZ 33	1984	

Products free from insecticides for indoor pest control and prevention	RAL-UZ 34	1985	
Wall paper and ingrain wall covering made from recycled paper	RAL-UZ 35	1985	
Building materials made from recycled paper	RAL-UZ 36	1985	
Halogen-free cooling and insulating liquids for electrical equipment	RAL-UZ 37	1985	
Low-formaldehyde products from wooden materials (for indoor use)	RAL-UZ 38	1986	
Low-emission gas burners	RAL-UZ 39	1986	
Combination boilers and circulating water boilers for gaseous fuels	RAL-UZ 40	1986	
Combined burner/boiler units with gas blast burner	RAL-UZ 41	1986	
Low noise mopeds	RAL-UZ 42	1986	
Water-economising flow regulators	RAL-UZ 43	1986	
Water-economising flushing valves	RAL-UZ 44	1986	
Soil meliorates and soil adjuvants made from compost	RAL UZ 45	1986	
Combined oil burner/boiler units	RAL-UZ 46	1987	
Solar-energy products and mechanical watches	RAL-UZ 47	1987	
Rapidly biodegradable chain lubricants for power saws	RAL UZ 48	1987	
Building materials predominantly made of recycles glass	RAL-UZ 49	1987	
Lithium batteries free of mercury and cadmium	RAL-UZ 50	1987	
Go-for-the-environment ticket	RAL-UZ 51	1988	
Highly heat-insulating multi-layer window glass	RAL-UZ 52	1988	
Low-noise construction machines	RAL-UZ 53	1988	
Low-noise compost choppers	RAL-UZ 54	1988	
Reusable ribbon cassettes and refillable toner cartridges	RAL-UZ 55a	1988	
Photoconductor drums for laser printers	RAL-UZ 55b	1991	
Recycled cardboard	RAL-UZ 56	1989	

Thermal techniques (hot air) for pest control of ligniperdous insects	RAL-UZ 57	1989	
Retrofitting catalytic converters	RAL-UZ 58	1989	
Low-noise and low-soot municipal vehicles	RAL-UZ 59	1990	
Building materials and gypsum made from recycled materials	RAL-UZ 60	1990	
Low-emission and energy-saving gas-fired condensing boilers	RAL-UZ 61	1990	
Low-emission and waste-reducing copiers (Copying machines)	RAL-UZ 62 (A.p.97, B.p.116)	1990	The criteria for labelling focus on the stages of use and disposal, reuse and recycling of products. In this case the production process were also taken into consideration.
Reprocessed fixing baths	RAL-UZ 63	1990	
Readily biodegradable lubricants and forming oils	RAL-UZ 64	1990	
Unbleached hot-filter paper	RAL-UZ 65	1990	
Low-pollutant fire extinguishers	RAL-UZ 66	1990	
Lead-free seals	RAL.UZ 67	1991	
Cadmium-free hard-solder	RAL-UZ 68	1991	
Low-waste, resource-saving text markers	RAL-UZ 69	1991	
Component-system detergents	RAL-UZ 70	1991	
Independent burning gas heaters and flued-bed built-in appliances with atmospheric burners	RAL-UZ 71	1991	
Newspaper printing paper (consisting predominantly of recycled paper and bleached without chlorine)	RAL-UZ 72	1991	
Solar collectors	RAL-UZ 73	1991	
Low-pollutant nail varnishes	RAL-UZ 74	1992	
CFC-free and energy saving refrigerators and freezers	RAL-UZ 75	1992	
-Registration procedures & information duties (D.I.3 & D.I.4)			
Detergents and Cleaners	BGBI III 783-8 Act on washing & cleaning agents BGBI III 8053-6-5, Ordinance on dangerous substances . (A.p.27, B.p.117)	1990	The Act on washing & cleaning agents lays down certain requirements concerning the information to be placed on the label. Packing or labels must include information on the main ingredients and the recommended dose rates, graded according to water hardness. The serial number award by the UBA has to be shown on the packaging. Washing, cleaning and hygienic products containing more than 0.1 per cent formaldehyde have to be labelled "enth≡lt formaldehyd" (contains formaldehyde). In 1990, **industry committed itself voluntary** to provide information on the packaging of relevant substances and active agent groups, in particular, and of the quantities used.

E. Voluntary agreements

-Self commitments (D.V.2)			
Construction materials containing asbestos	-(A.p.122)	1984	The voluntary agreement concern with the complete substitution of **asbestos** in construction material by 1990.
Varnishes and paints	-(A.p.122)	1984	The voluntary agreement concern with the reduction of the rate of **solvents and heavy metal compounds,** contained in varnishes and paints.
Antifouling paints (underwater paints for ships)	-(B.p.95)	1986	The voluntary agreement concern with the reduction hazardous substances contained in waterproof varnishes used for ships.
CFCs	-(B.p.95/96)	1975, 1987, 1990,	The voluntary agreements concern with:1) reduction of the use of CFCs as propellants, 2) reduction of the use of CFCs in aerosols, 3)phasing -out of all CFCs covered by the Montreal Protocol and, 4) taking back and reuses of CFCs from waste refrigerators and foamed insulation materials.
Wood preservatives	-(B.p.95)	1985	The voluntary agreement concern with the substitution of **PCP** in wood preservatives.
Fluorescent lamps	-(B.p.96)	1987	The voluntary agreement concern with the recycling of fluorescent lamps.
Refrigerators	-(B.p.96)	1988	The voluntary agreement concern with the disposal of refrigerators
Batteries	-(B.p.96)	1988	The voluntary agreement concern with the disposal of batteries
Dishwashers and washing machines	-(B.p.95)	1986	The voluntary agreement concern with the improvement of appliances used for cleaning and washing.
Hazardous chemicals	-(B.p.95)	1986	The voluntary agreement concern with the exports of hazardous chemicals.

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