CHAPTER 5

RESEARCH DESIGN AND METHODOLOGY

5.1 INTRODUCTION

In this chapter the research design and methodology to investigate the hypothesis stated in chapter 1 concerning the relationship between environmental responsibility and financial performance are presented. The period investigated and the companies selected for the purposes of this study are stated.

The measurement of environmental responsibility is discussed for the purposes of determining appropriate measures to use when establishing whether financial performance is higher for a company where environmental responsibility is higher. Measures of environmental responsibility are selected for the purposes of this study.

The measurement of financial performance is discussed for the purposes of determining appropriate measures to use when establishing whether financial performance is higher for a company where environmental responsibility is higher. Measures of financial performance are selected for the purposes of this study.

The sources of data used in measuring environmental responsibility and in measuring financial performance are stated, as well as the procedures followed to ensure the reliability of the data. Previous research relating to environmental and financial performance measures, as well as to methodology is considered. The methodology followed to determine whether financial performance is higher for a company where environmental responsibility is higher is discussed, including the use of correlation analyses, as well as sector trend analyses.

5.2 PERIOD INVESTIGATED

Internationally environmental reporting in annual financial statements only became really prominent from the beginning of the nineties. In South Africa this development started a few years later. (Van Niekerk 1998: 63.)

For the purposes of this study annual financial statements for the periods ending from 1994 to 1998 were investigated. All year-ends falling in a calendar year were grouped together, for example, the 1998 group consists of financial statements with year-ends from 31 January 1998 up to 31 December 1998.

5.3 SELECTION OF COMPANIES

The criteria for the selection of companies were as follows:

- Only listed companies were included as their published annual financial statements are freely available.
- Only companies listed on the Johannesburg Stock Exchange (JSE) during the calendar years 1994, 1995, 1996, 1997, and 1998 were included, provided they were still listed at the time of selection (29 March 1999).
- The investigation was not limited to certain sectors of the JSE in order to include all possible environmentally responsible companies.

Annual financial statements required for this study were obtained from the Bureau of Financial Analysis (BFA) of the University of Pretoria. The BFA receives annual financial statements of listed companies directly from the JSE as they become available, and follows up on companies of which no annual financial statements were received. A few companies' annual financial statements could not be obtained. Reasons why the annual financial statements were not available included a change in year-end or a very late publication of the annual financial statements.

To ensure that the few outstanding annual financial statements did not jeopardize the relevancy of the study, only annual financial statements that could be obtained

by 20 October 1999 were included.

5.4 MEASURING ENVIRONMENTAL RESPONSIBILITY TO ESTABLISH THE RELATIONSHIP WITH FINANCIAL PERFORMANCE

5.4.1 Previous research

Table 5-1 summarizes the measures of environmental performance (objective or perceptual) used in studies that examined the relationship between environmental performance and financial performance in comparison to the findings (positive, negative or neither) of those studies (refer to section 2.5).

Of the 18 studies listed below, all nine studies that concluded positively about the relationship between environmental performance and financial performance used objective measures of environmental performance, for example indexes prepared by the Council on Economic Priorities (an independent, research-oriented, non-profit organization), U.S. government data and information from the Investor Research Center's Corporate Environment Profile.

Of the seven studies that concluded negatively about the relationship between environmental performance and financial performance four studies used reputational ratings (perceptual measurements), Huckle (1995) used both content analysis (objective measurement) and reputational ratings, Mahapatra (1984) used pollution control expenditures directly as a measure of social responsibility, and Chen & Metcalf (1980) used an objective measurement for environmental performance but came to a negative conclusion due to the impact of firm size (refer to section 2.5).

The two studies that came to neither a positive nor a negative conclusion were that of Wilkinson who used content analysis of annual financial statements and reputational ratings (by black businessmen and women) as a measure of corporate social responsibility, and Bowman & Haire who used an objective measurement.

Measures of environmental performance related to findings of studies

Study	*Objective measure*	*Perceptual measure*	*Positive finding*	*Negative finding*	*Neither*
Bragdon & Marlin (1972)	*		*		
Bowman & Haire (1972)	*				*
Spicer (1978a)	*		*		
Chen & Metcalf (1980)	*			*	
Cochran & Wood (1984)		*		*	
Aupperle, *et al* (1985)		*		*	
Allen (1994)	*		*		
Hart & Ahuja (1994)	*		*		
Huckle (1995)	*	*		*	
Alexander & Buchholz (1978)		*		*	
Spicer (1978b)	*		*		
Shane & Spicer (1983)	*		*		
Stevens (1984)	*		*		
Mahapatra (1984)				*	
Klassen & McLauglin (1995)	*		*		
IRRC (1995)	*		*		
McGuire, *et al* (1988)		*		*	
Wilkinson (1989)	*	*			*

Table 5-1

It seems that using an objective measure contributed to positive findings relating to the relationship between environmental responsibility and financial performance, while perceptual measures seem to contribute to negative findings.

5.4.2 Measures of environmental responsibility selected

Measuring environmental responsibility was discussed in section 3.4. Based on that discussion it is clear that the control list and judgement scale used by Van Niekerk (1998) are objective measures developed from previous empirical research. The control list and the judgement scale used by Van Niekerk (1998) are also used in this study to determine environmentally responsible companies.

The control list and judgement scale is presented respectively in Appendix 1 and 2.

5.4.3 Data used in measuring environmental responsibility

The Department of Accounting and Finance of the University of Pretoria (UP) annually analyses annual financial statements to identify specific environmental reporting. A control list and a judgement scale similar to that of Van Niekerk are used. UP's control list and judgement scale are annually reviewed and adapted for new developments in the field of environmental reporting. UP made their control lists and analyses per company per year (1994 to 1998) available for the purposes of this study. The questions that corresponded to that of the control list of Van Niekerk were extracted from UP's data. Where a question was scored differently than was indicated by the judgement scale used by Van Niekerk, it was changed to reflect the scores used by Van Niekerk.

It was considered important to use the same control list and judgement scale for every year of the study in order to do a meaningful correlation analysis. If the questions of the control list varied every year it would have been extremely difficult to establish the effect of the different questions when doing the analysis.

The data per company obtained from UP were expressed as points after the judgement scale had been applied to the information collected by means of the control list. The points per company were divided by the total possible points to calculate an environmental reporting percentage. The environmental reporting

percentage of each company is used as the indicator of that company's level of environmental responsibility.

The environmental reporting percentages per company for every year from 1994 to 1998 are presented in Appendix 3.

The environmental reporting percentages per company were reviewed to identify possible omissions. Where a company did not have an environmental reporting percentage in one or more years but had for the other years, the annual financial statements for the year(s) without environmental reporting percentages were investigated for the level of environmental reporting, using the control list and judgement scale presented in Appendices 1 and 2. No significant adjustments were necessary.

5.5 MEASURING FINANCIAL PERFORMANCE TO ESTABLISH THE RELATIONSHIP WITH ENVIRONMENTAL RESPONSIBILITY

5.5.1 Previous research

Tables 5-2, 5-3 and 5-4 summarize the measures of financial performance as well as control variables used in studies that examined the relationship between environmental performance and financial performance in comparison to the findings (positive, negative or neither) of those studies (refer to section 2.5). "Positive" refers to a finding of a positive correlation between environmental performance and financial performance or another positive conclusion. "Negative" refers to a negative conclusion, e.g. that no relationship exists. "Neither" refers to a finding that is neither positive nor negative, e.g. the finding is inconclusive or contradictory.

Studies that used accounting numbers

Study	*Performance measure*	*Control*	*Finding*
Bragdon & Marlin (1972)	Average ROE and ROC, EPS growth		Positive
Bowman & Haire (1972)	Median ROE		Neither
Spicer (1978a)	ROE, P/E, total risk, beta		Positive
Chen & Metcalf (1980)	ROE, P/E, total risk, beta	Firm size	Negative
Cochran & Wood (1984)	EV, operating earnings to assets, operating earnings to sales		Negative
Aupperle, *et al* (1985)	ROA (one year; five years)	Risk	Negative
Allen (1994)	EV, ROA, ROE, ESR, EAR, SSR, SAR, cash flow	Risk and firm size	Positive
Hart & Ahuja (1994)	ROS, ROA, ROE		Positive
Huckle (1995)	ROAE, ROACE, ROATA	Risk	Negative

Table 5-2

The abbreviations used in table 5-2 are explained below:

EAR = Earnings to asset ratio

EPS = Earnings per share

ESR = Earnings to sales ratio

EV = Excess value (Excess market valuation)

P/E = Price earnings ratio

ROA = Return on assets

ROAE = Return on average equity

ROACE = Return on average capital employed

ROATA = Return on average total assets

ROC = Return on capital

ROE = Return on equity

ROS = Return on sales

SAR = Selling expense to asset ratio

SSR = Selling expense to sales ratio

Studies that used stock market measures

Study	*Performance measure*	*Control*	*Finding*
Alexander & Buchholz (1978)	Return on security	Risk	Negative
Spicer (1978b)	Return on security	Risk	Positive
Shane & Spicer (1983)	Abnormal returns	Risk	Positive
Stevens (1984)	Abnormal returns	Risk	Positive
Mahapatra (1984)	Average market return	Risk	Negative
Klassen & McLauglin (1995)	Abnormal returns	Risk, size, time	Positive
IRRC (1995)	Stock market results	High/low polluters	Positive

Table 5-3

Studies that used accounting numbers and stock market measures

Study	*Performance measure*	*Control*	*Finding*
McGuire, *et al* (1988)	ROA, total assets, sales growth, asset growth, operating income growth, market return (total and risk adjusted)	Risk	Negative
Wilkinson (1989)	ROE, returns to investors	Risk, industry effect	Neither

Table 5-4

The studies that used accounting numbers as performance measures were on average not as successful to prove a positive relationship between environmental responsibility and financial performance (refer to section 2.5) as the studies that used stock market measures.

Almost all the studies that used stock market measures controlled for risk, while most of the studies that used accounting numbers did not. Of the nine studies that controlled for risk five had positive and four negative findings relating to the relationship between environmental responsibility and financial performance.

The studies using stock market measures relating to abnormal returns (combined with positive or negative environmental events) were most successful to prove a positive relationship between environmental responsibility and financial performance.

5.5.2 Measures of financial performance selected

Measuring financial performance was discussed in section 4.4, including various measures often used to measure financial performance. From the previous research (section 5.5.1) it is clear that most researchers in studies that used accounting numbers, preferred to use a number of measures. An advantage of using more than one measure is that the different measures can serve to validate each other. Initially all the measures identified in section 4.4 were considered for selection. The following measures of financial performance were selected for purposes of this study:

- Return on equity (ROE);
- return on assets (ROA);
- return on capital (ROC);and
- economic value added (EVA)

Supportive reasons for selecting these measures are discussed in the following paragraphs.

The performance measure used most by studies using accounting numbers is ROE. Eighty percent of the studies that used accounting numbers selected ROE as a measure. This is not surprising since benefiting shareholders is the main goal of a company, therefore ROE is, in an accounting sense, the true bottom-line measure of performance (refer to section 4.4.3).

Sixty percent of the studies that used accounting numbers selected ROA. Almost all the studies since the mid-eighties included ROA as a performance measure.

ROC was not used that often by previous studies. However, it is regarded as a very important performance measure by Stewart (1990) (refer to section 4.4.8) who suggested the use of EVA to improve on ROC.

EVA is selected since this measure incorporates a long-term view, inherently incorporates risk and is not susceptible to the accounting and financing distortions of all other measures of profitability (Stewart 1990: 153). EVA considers the cost of all capital and corrects for potential distortions caused by generally accepted accounting principles (refer to section 4.4.9).

The following standard ratios used by the BFA for ROE, ROA, and ROC respectively were selected:

ROE = Profit after taxation / Average total owners' interest × 100

ROA = Normal profit before interest and taxation / Average total assets × 100

ROC = Profit after taxation / Average total capital employed × 100

The following general definitions and techniques are used in the calculation of these ratios: According to Zevenbergen (1989: 3) it is desirable to work with the average values of the current and previous years in a number of ratios, especially where balance sheet values are related to income statement items. "Normal profit" is defined as the profit excluding any profit or loss of an extraordinary nature (Zevenbergen 1989: 3). Intangible assets, e.g. goodwill, as well as deferred tax are excluded when calculating these ratios. Where group annual financial statements were presented, the ratios are based on group results.

For the purposes of calculating ROE, equity (or total owners' interest) represents the total interest of the ordinary and preference shareholders in the holding company, plus the outside shareholders' interest in the ordinary and preference shares of the subsidiaries. When calculating ROA, total assets are the sum of total fixed assets, total long-term investments and total current assets. Income from investments is included in normal profit before interest and taxation. When

calculating ROC, total capital employed is total owners' interest plus total long-term loan capital.

The BFA uses the following formula to calculate EVA:

EVA = (Return on total capital - Weighted average cost of capital) × Capital

The EVA values as calculated by the BFA were limited to industrial companies only. The reason for this is that financial, mining and investment companies do not provide the type of financial information required in their annual financial statements.

The EVA module allows the BFA analyst a choice whether to use the inflation adjustments or not. It was decided that the inflation adjustments would lead to more meaningful EVA values for the purposes of this study.

5.5.3 Data used in measuring financial performance

The BFA provided the data for the financial performance measures. Data for the ROE, ROA, and ROC ratios were obtained from the standard BFA ratio service. The BFA specifically calculated EVA for the purposes of this study. Financial performance data per measure and per company are presented in Appendix 4.

The data as presented in Appendix 4 were reviewed to identify and rectify any possible omissions. Where ratios could not be provided the reasons were that –

- the numerator was equal to zero or very small leading to a result that was too large to print;
- the denominator was negative resulting in a meaningless result for the specific ratio; or
- the denominator was equal to zero.

5.6 Methodology to determine what relationship exists between environmental responsibility and financial performance

5.6.1 Previous research

Table 5-5 summarises methodologies of previous studies. From table 5-5 it is clear that previous studies employed statistical tests to find answers to their research questions. Regression and correlation analyses were the methodologies most used in the studies, regardless whether the studies used accounting numbers as financial performance measures or stock market measures. The studies that used stock market measures often made use of financial event methodology in combination with cross sectional regression.

Methodologies of previous studies

Study	*Methodology*
Bragdon & Marlin (1972)	Correlation
Bowman & Haire (1972)	Matched split samples; non-parametric tests
Spicer (1978a)	Cross sectional regression
Chen & Metcalf (1980)	Cross sectional regression
Cochran & Wood (1984)	Regression
Aupperle, *et al* (1985)	Correlation
Allen (1994)	Non-parametric analysis; regression
Hart & Ahuja (1994)	Correlation
Huckle (1995)	Regression and correlation
Alexander & Buchholz (1978)	Rank order correlation
Spicer (1978b)	Market model; cross sectional regression
Shane & Spicer (1983)	Financial event methodology; cross sectional regression
Stevens (1984)	Financial event methodology, with grouping
Mahapatra (1984)	Rank correlations (non-parametric)
Klassen & McLauglin (1995)	Financial event methodology; cross sectional analysis
IRRC (1995)	Correlation
McGuire, *et al* (1988)	Correlation, one test across groups
Wilkinson (1989)	Chi squared test; correlation

Table 5-5

Regression analysis assumes that x is a mathematical variable, measured with negligible error, and that y is a random variable. Many applications of regression analysis involve situations where both x and y are random variables. The correlation model deals with the case where x and y are jointly normally distributed. (Hines & Montgomery 1980: 381; 386.)

For every study it was necessary to decide whether the variables were all independent or which ones assisted in predicting the others. The type of statistical tests depended on the view of the different variables.

5.6.2 Correlation analyses

The Department of Statistics of the University of Pretoria performed the correlation analyses for the purposes of this study. The purpose of the correlation analyses was to determine whether a correlation exists between the environmental reporting percentages (resulting measure of environmental responsibility) and the financial performance measure and what the nature of the correlation is. The results may indicate that no relation exists, or that the higher the environmental reporting percentage the higher the financial performance measure, or that the higher the environmental reporting percentage the lower the financial performance measure.

Correlation analyses were performed for the following groups of companies for every year from 1994 to 1998:

- The total qualifying population of companies;
- the total population excluding wild points regarding environmental reporting percentages; and
- companies reporting on environmental matters during four to five years of the period of the study.

The first correlation analysis was performed for the total qualifying population of companies. To qualify for the correlation analysis a company needed an environmental reporting percentage as well as a financial performance measure in

the same year. The financial performance measures ROE, ROA, and ROC were individually correlated with the environmental reporting percentages for all the companies, regardless of the JSE sector of the companies. The correlation of EVA with the environmental reporting percentages was limited to industrial companies as EVA was only calculated for industrial companies (refer to section 5.5.2).

A second correlation analysis was performed for the total population excluding wild points, i.e. companies without environmental reporting percentages during 1997 and 1998 but with some environmental reporting percentages during the period investigated. To qualify for the correlation analysis the same measures as described for the first correlation analysis were required.

A third correlation analysis was performed on the same basis as the first two correlation analyses. Only companies reporting on environmental matters during four to five years of the period of the study (including 1997 and 1998) were included.

Correlation analyses per sector were attempted but due to meaningless results as a consequence of the limited number of observations per sector, other ways had to be found to investigate trends relating to environmental responsibility and financial performance (refer to section 5.6.4).

5.6.3 Causality

Previous research did not establish causality between environmental responsibility and financial performance. The possibility to use the Granger causality test (Eviews 1998:216) for purposes of this study was investigated. Granger causality measures precedence and information content but does not by itself indicate causality in the more common use of the term (EViews 1998: 217). It was found that the Granger causality test could not be used for purposes of this study due to the limited environmental reporting percentages available per company. At least twenty environmental reporting percentages per company are required by the

Granger test. At this stage a maximum of five percentages per company are available (one percentage per annum per company for each of the five years tested).

5.6.4 Sector trend analyses

As discussed in section 5.6.2 a correlation analysis per sector was meaningless due to the limited number of observations per sector. However, as an analysis per sector has the potential to contribute meaningful information to the study, the following trend analyses were performed for every year from 1994 to 1998:

- Environmental responsibility per sector;
- average financial performance for environmentally responsible companies in comparison to average financial performance for companies without a environmental responsibility measure per sector; and
- data plots per sector.

5.6.4.1 Environmental responsibility per sector

It was necessary to analyse environmental responsibility per sector to identify the environmentally responsible group of companies in the sector, as well as their level of environmental responsibility. This would make the analysis of the financial performance of environmentally responsible companies in a sector versus the group without evidence of environmental responsibility possible.

Environmental responsibility per sector was analysed according to the following criteria:

- The environmental reporting percentages (measure of environmental responsibility – refer to 5.4.2 and 5.4.3) were identified for each company in each sector.
- Companies with wild points in the environmental reporting percentages were excluded (these companies were excluded on the same basis as for the second correlation analysis – refer to section 5.6.2, except that

companies with only 1998 environmental reporting percentages were included if that percentage was 10% or higher).

- An average environmental reporting percentage (ERP) was calculated per company in a sector for the period and the highest and the lowest average ERP per company in a sector were used as an indication to consider the level of environmental responsibility for that sector. (Refer to appendix 5 for the average ERP per company per sector.)
- The number of companies with ERP's in a sector, compared to the total number of companies, as well as the number of companies in a sector that have been reporting on environmental matters for four to five years were used to consider the level of environmental responsibility for that sector.

From the analysis of environmental responsibility per sector the following groups could be identified:

- Five sectors with no environmental responsibility percentages;
- sixteen sectors with little evidence of environmental responsibility;
- nine sectors with reasonable evidence of environmental responsibility; and
- eleven sectors with good evidence of environmental responsibility.

Sectors were selected for the analysis described in section 5.6.4.2 below based on the above groupings as well as the specific criteria described above.

5.6.4.2 Average financial performance for environmentally responsible companies in comparison to average financial performance for companies without an environmental responsibility measure per sector

Average financial performance measures (using the same measures as for the correlation analyses) were calculated for the group of environmentally responsible companies in a sector, as well as for the other group of companies in the sector without environmental reporting percentages. These average financial

performance measures per group were used to analyse the financial performance of the environmentally responsible group (represented by companies with ERP's) in a sector versus the others in the sector.

This analysis was limited to the sectors identified for further analysis from the work done relating to environmental responsibility per sector (refer to 5.6.4.1).

Trends relating to which of the groups performed best per sector were identified where possible as follows:

- For every year and for every financial performance measure (ROC, ROA, ROE and EVA) it was determined whether the group with ERP's or the group without ERP's has the highest average financial measure in a sector.
- It was then considered if a clear trend per sector exists, i.e. whether for all or most of the years and financial measures, either the group with the ERP's or the group without the ERP's has the highest average financial measures, or if no trend exists.

5.6.4.3 Data plots per sector

Although a meaningful correlation analysis per sector was not possible (refer above and to section 5.6.2) it is still possible to use data plots per sector to identify possible trends relating to the relationship between environmental responsibility and financial performance. The trends identified from data plots per sector may be considered rather subjective, but the value thereof lies in the additional evidence that could be obtained. The additional evidence were considered together with the trends identified in section 5.6.4.2 (the average financial performance for the group with ERP's compared to the group without ERP's).

The ERP's are plotted on the x-axis and the financial performance measures (ROC, ROA, ROE or EVA) are plotted on the y-axis. The data plots per sector were done for each financial performance measure separately. The plots included every company in a sector's ERP (as presented in appendix 3) as well as its

financial performance measure (as presented in appendix 4) for 1994, 1995, 1996, 1997 and 1998. Plots were not prepared for sectors with limited data, e.g. less than ten data points over the five-year period.

5.7 SUMMARY AND CONCLUSIONS

For the purposes of this study annual financial statements for the periods ending from 1994 to 1998 were investigated. Only listed companies were included as their published annual financial statements are freely available. Only companies listed on the JSE during the calendar years 1994, 1995, 1996, 1997, and 1998 were included, provided they were still listed at the time of selection. The investigation was not limited to certain sectors of the JSE in order to include all possible environmentally responsible companies.

The control list and the judgement scale used by Van Niekerk (1998) are objective measures developed from previous empirical research. The control list and the judgement scale used by Van Niekerk (1998) were selected to be used in this study to determine environmentally responsible companies.

The Department of Accounting & Finance of the University of Pretoria provided the data for the environmental responsibility measure expressed as points after the judgement scale had been applied to the information collected by means of the control list. The points per company were divided by the total possible points to calculate an environmental reporting percentage. The environmental reporting percentage of each company is used as the indicator of that company's level of environmental responsibility.

An advantage of using more than one measure of financial performance is that the different measures can serve to validate each other. Initially all the measures identified in section 4.4 were considered for selection. The following measures of financial performance were selected for purposes of this study:

- Return on equity (ROE);

- return on assets (ROA);
- return on capital (ROC);and
- economic value added (EVA)

Reasons for selecting these measures are as follows:

- The performance measure used most by studies using accounting numbers is ROE. Eighty percent of the studies that used accounting numbers selected ROE as a measure.
- Sixty percent of the studies that used accounting numbers selected ROA. Almost all the studies since the mid-eighties included ROA as a performance measure.
- ROC was not used that often by previous studies. However, it is regarded as a very important performance measure by Stewart (1990) (refer to section 4.4.8) who suggested the use of EVA to improve on ROC.
- EVA is selected since this measure incorporates a long-term view, inherently incorporates risk and is not susceptible to the accounting and financing distortions of all other measures of profitability.

The BFA provided the data for the financial performance measures. Data for the ROE, ROA, and ROC ratios were obtained from the standard BFA ratio service. The BFA specifically calculated EVA for the purposes of this study.

The Department of Statistics of the University of Pretoria performed the correlation analyses for the purposes of this study. The purpose of the correlation analyses was to determine whether a correlation exists between the environmental reporting percentages (resulting measure of environmental responsibility) and the financial performance measure and what the nature of the correlation is.

Correlation analyses were performed for the following groups of companies for every year from 1994 to 1998:

- The total qualifying population of companies;
- the total population excluding wild points regarding environmental reporting percentages; and
- companies reporting on environmental matters during four to five years of the period of the study.

To qualify for the correlation analyses a company needed an environmental reporting percentage as well as a financial performance measure in the same year. The financial performance measures ROE, ROA, and ROC were individually correlated with the environmental reporting percentages for all the companies, regardless of the JSE sector of the companies. The correlation of EVA with the environmental reporting percentages was limited to industrial companies as EVA was only calculated for industrial companies (refer to section 5.5.2).

Previous research did not establish causality between environmental responsibility and financial performance. The possibility to use the Granger causality test for purposes of this study was investigated. It was found that the Granger causality test could not be used for purposes of this study due to the limited environmental reporting percentages available per company.

Correlation analyses per sector were meaningless as a consequence of the limited number of observations per sector. Analyses per sector were performed by way of the following trend analyses for every year from 1994 to 1998:

- Environmental responsibility per sector;
- average financial performance for environmentally responsible companies in comparison to average financial performance for companies without a environmental responsibility measure per sector; and
- data plots.