

A perceptual study of the impact of green practice implementation on the business functions

E.E. Smith & S. Perks

ABSTRACT

This article outlines the perceptions of businesses regarding the impact of green practice implementation on the business functions. To achieve the aim of this study, an in-depth literature study and empirical research were undertaken. A self-administered questionnaire was completed by 298 owners, managers and employees in businesses within the Nelson Mandela Metropole. To investigate the relationship between the independent (classification data) and dependent variables (perceptions of impact on business functions), 13 null hypotheses were tested. The results revealed significant relationships between these variables. It was found that the functions least impacted by green business practices are general management/human resources, purchasing/supply chain management and finance/information technology. Further analysis of the business functions reveals that the manufacturing/operations, marketing/sales and distribution/logistics functions are the most impacted by green business practices. Practical guidelines are provided to assist in greening the business functions.

Key words: green practices, business functions, social responsibility, ethics

Introduction and background

The effects of climate change, along with pollution and the depletion of non-renewable natural resources, has given rise to environmental awareness (Douglas 2006: 458). A key global challenge in the 21st century is how to address climate change and reduce

Prof. E.E. Smith & Prof. S. Perks are in the Department of Business Management, Nelson Mandela Metropolitan University. E-mail: Elroy.Smith@nmmu.ac.za

greenhouse gas emissions (UN 2007). Consumers in recent years have become aware of the damage being inflicted on the environment by businesses in pursuit of the bottom line. Government regulatory bodies and consumer pressure groups have aggressively lobbied for businesses to adopt green practices (Bateman & Zeithaml 1983: 192). As a result, policies that focus on the protection of the environment are continually being developed worldwide (Brunoro 2008: 719). Businesses can assist in protecting the environment by becoming green businesses, in other words sustainable businesses (Porritt & Winner 1988). Daft (2008: 154) defines a sustainable business as an economic development that generates wealth and meets the needs of the current generation while saving the environment for future generations. According to Verdiem Corporation (2008), sustainability has become a major focus for businesses, as it was discovered that sustainable practices can strengthen reputation, improve employee morale, lead to cost savings and benefit the environment. Businesses value sustainable growth either by force of regulation, or because they see an economic opportunity in preventing pollution or recognising the strategic importance of environmental issues (Hendry & Vasilind 2005: 252).

In South Africa, sustainability has been addressed in the King III Report in terms of the triple bottom-line concept of economic, social and environmental sustainability (Carroll & Buchholtz 2000: 57). Van Wyk and Deegan (2009: 1) indicate that both large and small businesses have to adhere to the principles of the King III Report. The establishment of the ISO 14000 standards took place at the Rio Summit on the Environment and provided a framework for Environmental Management control systems, such as ISO 14001 and ISO 14002 (Sustainable Business 2009: 1). It also includes a framework for the Eco Management and Audit Scheme, which require businesses to obtain certification from a third party. A South African company, Green Business R, is responsible for this certification. Environmental exploitation and sustainability is of long-term concern in South Africa (Finlay 2000: 81). The natural environment has become an important variable within current competitive scenarios, and businesses are developing new and innovative ways to enhance their global competitiveness (Lin & Ho 2008: 17). Furthermore, a business can enhance its competitiveness through improvements in environmental performance to comply with environmental regulation, to address the environmental concern of customers and to reduce the environmental impact of its product and service activities.

The purpose of this article is to determine how business functions are affected by 'going green'. Firstly, the problem statement and objectives of the research project are provided. A theoretical exposition of what 'going green' entails and the impact thereof on business functions will be outlined. Thereafter, the research methodology of the study will be highlighted. The research results will be given, followed by the

main conclusions and guidelines for businesses to implement green issues within business functions.

Problem statement

Engel (2008: 1) asserts that South Africa has made significant progress with environmental management in the last decade by implementing laws and strategies that focus on sustainable development and green issues. In spite of this notion, most businesses still do not recognise the need to become green. Previously, businesses assumed that incorporating 'green' into their business strategy would cost money, but they now realise that ignoring negative impacts on the environment will be costly in the future (Van der Zee 2008: 6). The purpose of going green is to use products and methods that would not negatively impact the environment through pollution or depleting natural resources (Robinson (2008: 1). If the use of natural resources is reduced by using alternative sources, it will have positive outcomes such as keeping the environmental footprint small, reducing waste and re-using materials as much as possible (Dallas 2008: 9). Furthermore, it will result in using scarce natural resources efficiently and effectively, while keeping the environment free from detrimental products. Green businesses should have green visions, with strategic plans based on long-term objectives rather than only short-term goals (Gunningham, Kagan & Thornton 2003).

In today's global business environment, businesses are facing increased competitive, regulatory and community pressures. Furthermore, there is also pressure for environmental sustainability, which requires strategies to be put in place to reduce the environmental impacts caused by the products and services offered. Clem (2008) adds that going green reflects a social consciousness around saving and advancing the Earth's natural resources, preserving and protecting them for the sake of civilisation. As customers become more aware of environmental issues, there is an increase in the demand for ecological products. This increased awareness of and sensitivity towards environmental issues places certain demands on business functions to become greener.

The preceding discussion leads to the research question to be addressed in this research project, namely: How do businesses perceive the impact of green practice implementation on the business functions?

Objectives

The primary objective of this article is to explore how businesses perceive the impact of green practice implementation on the business functions. To help achieve this primary objective, the following secondary goals were identified:

- To determine what green business practices entail and the impact of the implementation thereof on the business functions
- To empirically establish perceptions regarding the influence of green practice implementation on the business functions
- To provide guidelines on how businesses could implement green practices in each of the business functions.

Theoretical overview of green business practices

Definition of green business

The term 'green businesses' is defined by Smith (2003: 1) and Friend (2009: 5) as businesses and practices that are viewed as environmentally sound, including the use of organic and natural products to build factories, tighter protection against emissions and environmentally friendly sourcing of materials. Zsolnai (2002: 656) defines a green business as a business that has adopted the concept of environmentalism across the various functions of the business. Gilbert (2007: 1) identifies a green business activity as any activity that is performed in a manner that has either limited negative ecological impact or directly benefits the natural environment in some way. Morebusiness.com (2009) describes a green business as using less natural resources to complete the tasks needed and using sustainable methods and materials such as recycling (paper, plastic, electronics, glass and aluminium) and using sustainable products (recycled, plant-based or organically grown).

Impact of green practice implementation on the business functions

The effect of green business practices requires an in-depth knowledge of client requirements together with the ability to satisfy these requirements while contributing to environmental sustainability. Managers need to develop systems and structures within their business that satisfy the requirements of green business practices while still achieving strategic business goals. Various authors (for example,

Bized 2010: 1; Bosch, Tait & Venter 2006: 32; Ghorpade 2004: 235; Seese, Weinhardt & Schlottmann 2008: v) use different classifications for the business functions. These classifications assisted the researchers in grouping the functions into six logical groups so as to eliminate duplication of activities, as well as to simplify the analysis of the empirical results. The functions were grouped as follows: manufacturing/operations; marketing/sales; purchasing/supply chain management; distribution/logistics; finance/information technology; and general management/human resources. Table 1 outlines the impact of going green on the business functions, based on the literature study conducted.

Demographic influences regarding green business practice implementation

Although various authors (for example, Chan 2000: 7; Frooman 2005: 3; Peattie 2001: 129) have attempted to investigate green business practice implementation and the role played by demographical variables, contradictory results have been reported. Ferraro (2009) is of the opinion that being 'green' and green concerns are extremely diverse and that not all environmentally responsible businesses are the same. This often makes it difficult to define green businesses and consumers; however, demographical variables could assist in explaining what constitute a green business or consumer. Gilg, Barr and Ford (2005: 481) concur that putting aside the arguments relating to the definition of 'green', limited research has been done to assess the influence of demographic variables on green practice implementation. D'Souza, Taghian and Khosla (2007: 69) investigated consumer's intention to purchase green products and businesses' green purchasing systems and found that demographic profiles could play an important role. Chitra (2007: 173) states that due to increased awareness of green business practices, there is a need for businesses to implement green elements in their product profile and recommends that the influence of demographic variables should be investigated. Despite these claims, Williams (2005) argues that there is little evidence that demographics influence green business practice implementation perceptions.

Based on the foregoing reasoning, the following demographic (independent) variables are used in this study as to establish its relationship with perceptions of the impact of green practice implementation on the business functions (dependent variables): type of industry; size of business; position occupied; functional area employed; years' involvement with green practices; ethnic group and age. The null hypotheses tested in this study are outlined in the next section.

Table 1: Impact of green practices on the business functions

<p>Manufacturing/Operations function</p> <p>Sources: Boylan 1995: 388; Business Knowledge Source 2009; Cairncross 1995: 179; eNotes.com 2009; Harrington, Jackson & Staude 2006: 57; Hopfenbeck 1993: 36, 94; Info-Corporate 2007; Monbiot 2005; Pearce & Robinson 2003: 41; Wankel 2008: 257; Wikipedia 2009</p>
<ul style="list-style-type: none"> • Focus on profitability by using environmentally friendly operating processes. • Plant indigenous trees, foliage, use rainwater or recycled grey water to reduce ecological damage. • Use alternative materials and redesign operations. • Produce durable products from design to disposal by decreasing ecological damage to ensure sustainable development. • Find green alternatives for harmful products, at the same or improved level, at lower cost. • Consider input costs in terms of regulations, energy use, storage and disposal. • Reduce raw materials, energy use and toxic waste for businesses savings. • Use eco-friendly materials, procedures and processes, and ensure optimal raw materials usage. • Recycle waste products (e.g. plastic, paper, glass) to increase operating income and consider expansion of production capacity. • Eliminate waste through efficient asset operations (e.g. considering a network of locations and facilities). • Choose wisely between new and costly developments and cheaper equipment alternatives so as to ensure efficient asset operation. • Minimise emissions, effluents and accidents and use non-renewable forms of energy. • Use lean manufacturing to incorporate green goals into productive outcomes. • Production methods, tools and techniques must satisfy environmental requirements and market needs. • Research and development should explore new sustainable ways of extracting raw materials and new methods to minimise energy generation and waste disposal in production processes.
<p>Marketing/Sales function</p> <p>Sources: Bosch et al. 2006: 687; Cobb 2009: 16; Freemantle & Rockey 2004: 90; Green Consultants 2009; Greenwood 2008: 52; Hellriegel, Jackson & Slocum 1998: 290; Hopfenbeck 1992: 182-187; Info-Corporate 2007; Janowski 2008; Lewis 2008; McDonough & Prothero 2007: 389; Mellahi & Wood 2003; Miller & Buys 2008: 555-556; Muller 2005: 164; My Green Choices 2009; Timmins 2009: 34; Weiss 2006: 173; Wikipedia 2009</p>
<ul style="list-style-type: none"> • Enhance consumer environmental awareness of green products. • Satisfy customer needs for green products or provide products in a green manner to ensure business credibility. • Obtain a green reputation and brand image and attract a new and larger client base. • Having good environmental credentials provides a competitive edge when tendering for contracts. • Create a balance between higher sales and profits, and concern for the environment. • Gain public approval and cut costs by using green marketing. • Eliminate pollution and reduce green gas emission to open new markets. • Use green issues to sell new lifestyles and ideas. • Advertise green initiatives effectively to acquire a greater market share. • Include green business practices in overall corporate message to attract new customers. • Choose packaging material with minimal impact on the environment. • Use resource preservation and environmentally friendly strategies in all stages of the value chain. • Commitment to invest in green research and development initiatives. • Integrate green marketing into the marketing mix with eco-friendly products. • Use new directions in product distribution (e.g. running retro-distribution systems). • Portray an environmentally friendly business image through advertising and sales promotion to all stakeholder groups. • Use green practices for positive positioning to project a corporate social responsibility image. • Ensure customer awareness of personal health risks if not using green products. • Employees volunteering time or supporting charitable donations could make the general public more environmentally knowledgeable.

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Table 1 continued

<p style="text-align: center;">Purchasing/Supply chain management function</p> <p>Sources: Bowen, Cousins, Faruk & Lamming 2007: 41; Freemantle & Rockey 2004: 19; Millett 2000: 71; Silins 2009: 46; Play a Greater Part.org 2007; Sustainable Business 2009</p> <ul style="list-style-type: none"> • Seek suppliers (by consulting the International Purchasing Network) with green production processes to offset financial and environmental risk. • Apply environmentally preferable criteria in procurement processes. • Choose suppliers with good waste management systems and use energy-saving production methods that discharge minimum gases. • Use raw materials that are environmentally friendly and recycle where possible to save the environment. • Choose suppliers committed to sound environmental performance. • Supply chain must not produce harmful products. • Ensure that ISO 14000 standards are met. • Use e-procurement to offer green products at cheaper prices.
<p style="text-align: center;">Distribution/Logistics function</p> <p>Sources: Blanchard 2008: 1; Larkin 2008: 8; New Zealand Business Council for Sustainable Development 2003; Silins 2009: 46; Thomex.com 2009; Wankel 2008: 257, 258; Wu & Dunn 1995: 20; Yeoman & Zoetmulder 2009</p> <ul style="list-style-type: none"> • Limit distances travelled for raw materials and finished products. • Have a green or sustainable building (e.g. multi-level warehouse) using healthier and more resource-efficient construction materials. • Save warehouse space by cutting transport costs and number of trips. • Establish suppliers' partnerships to share warehouses and fleets. • Identify shortest distance between warehouse and customers to save fuel costs. • Limit carbon emissions (according to legislation) linked to the movement of goods, transit packaging used for distribution, the operation of distribution facilities, and damage or wastage. • Use biofuels as fuel alternative and greener technologies. • Centralise distribution (e.g. in-transit packaging).
<p style="text-align: center;">Finance/Information technology function</p> <p>Sources: Ashworth 1992: 127; Carroll & Buchholtz 2000: 385; Garen 2009: 117; Greenwood 2008: 52; Harrington et al. 2006: 62; Harris 2008: 139; Hewlett Packard 2009; Hopfenbeck 1992: 40; Janowski 2008; Lesourd & Schilizzi 2001: 34; McKay 2008: 18; Millet 2000: 3; Mintzer 2008, 2009; Perrini, Pogutz & Tencati 2006: 73; Rose 2008; Stead & Stead, 2004: 45; Ward 2008</p> <ul style="list-style-type: none"> • Use green buildings to cut energy bills. • Implement a recycling policy without an additional capital outlay. • Ensure better management of waste disposal in order to save costs. • Create more favourable risk profiles and improved relations with financial institutions using green business practices. • Develop more effective environmental auditing systems. • Eliminate risks associated with public lawsuits or 'watchdog' groups by implementing green strategies. • Communicate green business strategies to staff for effective goal attainment. • Improve the business's bottom line by conserving resources and cutting down on waste. • Expand board members' and accountants' responsibility to include the triple bottom line. • Invest in green projects. • Use advanced cutting edge technology to move to a paperless administrative environment. • Utilise more electronic business processes and work methods. • Find cheaper ways to communicate (e.g. store information in computer databases and centralise ICT systems) to decrease cost. • Use an integrated holistic eco-information system. • Get up-to-date information about new environmentally friendly technology.

continued

Table 1 continued

<p>General management/Human resources function Sources: Aquis Group 2009; Barclay & Grosvenor 2007: 291; Carroll and Buchholtz 2000: 385; Cisco Systems 2008; Daily & Huang 2001; Flynn 2008: 3; Freemantle & Rockey 2004: 19; Haden, Pane & Humphreys 2009; Hopfenbeck 1993: 360; Huckle & Sterling 1996; Jackson 2009; Keeping & Shiers 1996: 15; Kozlowski 2003, in Miller & Buys 2008; McClenahan & Anderson 2009; Miller & Buys 2008: 555-556; Stead & Stead 2004: 45; Thornton, Kagan & Gunningham 2003: 127; Vaccaro 2008: 69; Wankel 2008: 258</p>
<ul style="list-style-type: none">• Use e-recruitment to minimise recruitment cost.• Use green businesses and buildings to enhance productivity and health of staff and reduce absenteeism.• Use a green workplace, corporate culture and reward systems to motivate or encourage green activities.• Make employees aware of pollution reduction using education and training.• Use teleconference technology to reduce travel, time and expenses as well as greenhouse gas emissions.• Employ experts in environmental development to implement environmentally friendly management systems and policies.• Increase employee productivity by creating a healthier working environment.• Design business strategies to address environmental issues that satisfy stakeholder expectations on social issues, environmental performance and daily environmental risks.• Act within local government expectations and environmental laws to align strategies with those of suppliers to avoid fines.• Appoint new board members to add unique external perspectives on sustainability.

Hypotheses and research methodology

The following section provides an outline of the hypotheses and research methodology followed in this study.

Hypotheses

A thorough ANOVA analysis was conducted between the seven independent variables (classification data) and the six dependent variables (business functions). A total of 42 hypotheses were originally formulated, but only the 13 hypotheses that indicate statistically significant relationships between the independent and dependent variables are highlighted. The other 29 hypotheses did not indicate any significant relationships and are thus not reported in this article. The null hypotheses with statistically significant relationships are the following:

H₀₁ The perceptions of the influence of green practice implementation on the *manufacturing/operations function* do not differ regardless of the size of a business.

H₀₂ The perceptions of the influence of green practice implementation on the *manufacturing/operations function* do not differ regardless of the position occupied by respondents in the business.

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- H0₃ The perceptions of the influence of green practice implementation on the *manufacturing/operations function* do not differ regardless of the number of years involved in green business practices.
- H0₄ The perceptions of the influence of green practice implementation on the *marketing/sales function* do not differ regardless of the size of the business.
- H0₅ The perceptions of the influence of green practice implementation on the *marketing/sales function* do not differ regardless of the position occupied by respondents in the business.
- H0₆ The perceptions of the influence of green practice implementation on the *marketing/sales function* do not differ regardless of the number of years involved in green business practices.
- H0₇ The perceptions of the influence of green practice implementation on the *purchasing/supply chain function* do not differ regardless of the size of the business.
- H0₈ The perceptions of the influence of green practice implementation on the *distribution/logistics function* do not differ regardless of the size of the business.
- H0₉ The perceptions of the influence of green practice implementation on the *distribution/logistics function* do not differ regardless of the number of years involved in green business practices.
- H0₁₀ The perceptions of the influence of green practice implementation on the *finance/information technology function* do not differ regardless of the industry in which a business operates.
- H0₁₁ The perceptions of the influence of green business practice implementation on the *finance/information technology function* do not differ regardless of the size of the business.
- H0₁₂ The perceptions of the influence of green business practice implementation on the *finance/information technology function* do not differ regardless of the number of years involved in green business practices.
- H0₁₃ The perceptions of the influence of green business practice implementation on the *general management/human resources function* do not differ regardless of the size of a business.

The alternative hypotheses (H₁ to H₁₃) can be formulated as the exact opposite of the preceding null hypotheses, indicating that there are differences/relationships between the variables. The reason for the inclusion of the afore-mentioned hypotheses is that differences exist only between the following four independent variables (classification data): industry; size of business; position occupied; and years involved in green business practices, and all the dependent variables (business functions).

No relationships exist between the classification data variables: functional area employed; ethnic group; and age, and the dependent variables (business functions).

Research approach

The positivistic or quantitative research method is used in this study, where the emphasis is on the quantification of variables and statistical controls. The main approaches followed are exploratory and descriptive research aimed at exploring and describing the perceptions of businesses of the influence of green practice implementation on the business functions.

Population and sampling procedure

For the purpose of this research project, the target population consists of all businesses in the Nelson Mandela Metropole that are involved in green business practices to some extent. Very small businesses not practising green business principles were disregarded in compiling the sample. The unit of analysis is therefore businesses involved in green business practices. A non-probability sampling technique (convenience sampling) is used. Field workers conducted the research in various areas within the Nelson Mandela Metropole. The total sample size was 298.

Data collection

Secondary data were collected by means of an extensive literature study that included textbooks, journal articles and the internet. Primary data were collected by means of a survey using field workers. In total, 320 self-administered questionnaires were distributed to businesses in the Nelson Mandela Metropole that have engaged in some form of green business practices. The field workers had established prior to administering the questionnaire whether these businesses had indeed implemented any green business practices. Only 298 questionnaires were returned, giving an effective response rate of 93.13%.

Questionnaire design

Based on the size of the sample (298), a survey by means of self-administered questionnaires was best suited to this study (Babbie & Mouton, 2003: 258). The questionnaire consisted of two sections:

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- Section A dealt with variables or statements regarding the perceptions of respondents on the impact of green practice implementation on the business functions. Six factors or business functions were tested, namely: manufacturing/operations; marketing/sales; purchasing/supply chain management; distribution/logistics; finance/information technology; and general management/human resources. A total of 45 variables were tested in this section. Led by the literature study, it was evident that some factors contained more variables than others. This was an indication that some factors (functions) might be more exposed and impacted by green practices. The ordinal scale used was based on semantic differential scaled-response questions according to a five-point Likert-type scale (ranging from 'strongly agree' to 'strongly disagree').
- Section B provides classification data (demographic characteristics) of respondents and contains a nominal scale of measurement using categorical variables. Seven classification data variables were tested, namely: industry type; employment size; position occupied; functional area employed; number of years involved in green practices; ethnic group; and age.

Pilot study

As the questionnaire had never been used previously, it was distributed to ten businesses in the designated region, involved in some form of green business practices (convenient sample). The questionnaire was also given to several academics in the field of business management and a statistical expert. Some problem areas were identified and suggestions for improvement were provided, which ensured face validity of the questionnaire.

Data processing and analysis

Completed questionnaires were inspected, edited and coded, and the data were transferred to an Excel spreadsheet. The data were analysed by means of the SPSS statistical software package. The techniques used during the data analysis stage of the research project included descriptive statistics (such as mean, standard deviation and range), frequency distributions (percentages), reliability testing (Cronbach's alpha), correlation coefficients and analysis of variance.

Results

Descriptive statistics

Table 2 provides a summary of the descriptive statistics for Section A of the questionnaire (business functions).

Table 2: A summary of the descriptive statistics for Section A of the questionnaire: Business functions

Items/ Variables	Factor (Function)	Mean	Standard deviation	Variance
1-11	Manufacturing/operations (A1)	2.75	0.79	0.62
12-20	Marketing/sales (A2)	2.80	0.71	0.51
21-26	Purchasing/supply chain management (A3)	2.72	0.77	0.59
27-34	Distribution/logistics (A4)	2.49	0.69	0.48
35-39	Finance/information technology (A5)	2.73	0.77	0.60
40-45	General management/human resources (A6)	2.75	0.74	0.55

With regard to the descriptive statistics of each variable, no in-depth discussion is provided, as it falls beyond the scope of this article. As regards the measure of central tendency (mean values) of these factors, it appears that most of these values cluster around point three (neutral) on the instrument scale. Only one of the six factors (functions) scored a mean value around point two (agree) on the instrument scale, namely the distribution/logistics function. None of the mean scores lies on the disagreement side of the scale (points four and five), indicating that most of the respondents agree with or are neutral towards the statements regarding the impact of green practice implementation on the business functions. In calculating the overall mean values, all variables have been taken into account for all respondents, and the mean value was then calculated for each factor. Two measures of dispersion were used, namely standard deviation and variance. The distribution/logistics factor has the lowest standard deviation (0.69), while the manufacturing/operations factor has the highest standard deviation value (0.79). It appears that respondents do not vary much in their responses to these business functions. Table 3 provides a profile of the respondents of this study by indicating the frequency distribution results for the demographic data.

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Table 3: Frequency distribution results: A respondent profile

Characteristic	Category	(%)
Industry	Agriculture, forestry and fishing	5
	Architecture	2
	Bricks, ceramics, glass, cement products	3
	Catering and accommodation	7
	Financial, insurance, real estate	23
	Manufacturing	19
	Retail	23
	Other	18
Employment size	<199	67
	200-499	13
	>500	20
Position occupied	Owner	20
	Co-owner	16
	Manager/employee	62
	No response	2
Functional area employed	Logistics/distribution	6
	Finance/administration	20
	Purchasing/supply chain management	14
	Manufacturing/operations	29
	Marketing/sales	13
	Human resources	5
	No response	13
Years involved in green practices	<1 year	25
	1-3	43
	4-6	20
	>6	2
	No response	10
Ethnic group	Black	29
	White	47
	Coloured	19
	Other	5
Age	18-25 years	12
	26-35	32
	36-45	25
	46-55	23
	56-65	5
	66+	1
	No response	2

From Table 3, it is evident that the majority of respondents were in the retail (23%); finance, insurance and real estate (23%); and manufacturing (19%) industries. Sixty-

seven percent of the respondents were employed in smaller businesses (employment size <199), while 20% were employed in larger businesses (>500). The majority of the respondents (62%) were managers or employees, while 36% were owners/co-owners. Regarding the functional area in which respondents were employed, it appears that the majority were employed in manufacturing/operations (29%) and finance/administration (20%). Forty-three percent of the respondents had been involved in green business practices for between one and three years, while 25% had been involved for less than one year. In terms of ethnicity, 47% of the respondents were white, 29% black, and 19% coloured. Fifty-seven percent of the respondents were between the ages of 26 and 45, and only 12% were younger than 26 years.

Frequency distribution results of perceived green business functions

Further analysis indicates the extent to which the businesses had already implemented green practices in the business functions. To determine the frequency of the responses indicated in Table 4, the results were combined with points one and two (agree), three (neutral) and four and five (disagree). The frequency refers to the total number of times that the statements of a specific function were selected by respondents in the three respective categories. The average was calculated by dividing the frequency by the number of statements in a particular factor/function. The factors (business functions) were ranked according to the highest agree average.

Figure 1 illustrates respondents' perceptions regarding the 'greenness' of their business functions. The functions perceived to have been the least 'green' are general management/human resources, purchasing/supply chain management, and finance/information technology. The manufacturing/operations, marketing/sales and distribution/logistics functions are perceived to be the most 'green'.

Reliability and validity of the measuring instrument

External validity refers to the generalisation of research results to other population groups and was ensured by means of clear guidelines regarding the place, time and conditions in which the research was to be conducted. The internal validity of the instrument's scores is ensured through both face and content validity. Expert judgement by researchers in business management and statistics was solicited, and a pilot study among ten businesses in the designated region was undertaken. The

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Table 4: Frequency distributions of perceived green business functions

Business functions	Scale measurement	Frequency	Average	%	Overall ranking based on agree
Manufacturing/Operations (A1)	Agree	1774	161.28	55	1
	Neutral	963	87.55	30	
	Disagree	493	44.82	15	
Marketing/Sales (A2)	Agree	1674	139.50	47	2
	Neutral	1079	89.92	31	
	Disagree	793	66.08	22	
Purchasing/Supply chain management (A3)	Agree	666	111.00	37	5
	Neutral	688	114.67	39	
	Disagree	425	70.83	24	
Distribution/Logistics (A4)	Agree	960	120.00	41	3
	Neutral	753	94.13	32	
	Disagree	639	79.88	27	
Finance/Information technology (A5)	Agree	590	118.00	40	4
	Neutral	501	100.20	34	
	Disagree	374	74.80	26	
General management/ Human resources (A6)	Agree	284	94.67	32	6
	Neutral	306	102.00	35	
	Disagree	292	97.33	33	

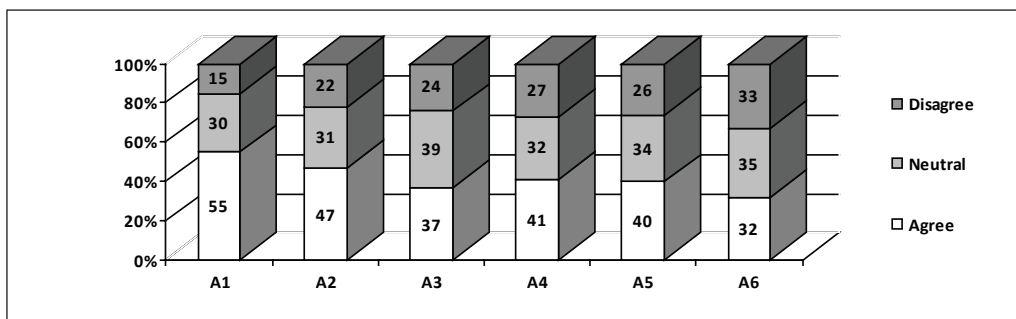


Figure 1: Perceived impact of green practices on business functions

statistical software package SPSS was used to determine Cronbach's alpha values for the six predetermined factors (business functions). To confirm the internal reliability of the six factors, Cronbach's alpha was calculated (refer to Table 5).

The reliability coefficients of Cronbach's alpha values for the various factors are all above 0.7. It can therefore be concluded that all factors are internally reliable.

Table 5: Cronbach's alpha for Section A of the questionnaire: Business functions

Variables	Factor/Function	Cronbach's Alpha
1-11	Manufacturing/Operations (A1)	0.86
12-23	Marketing/Sales (A2)	0.83
24-29	Purchasing/Supply chain management (A3)	0.83
30-37	Distribution/Logistics (A4)	0.85
38-42	Finance/Information technology (A5)	0.70
43-45	General Management/Human resources (A6)	0.81

Correlation

As regards the correlation between the variables that constitute each factor, an inter-item correlation exercise was conducted. It appears that all the variables in each factor show strong positive relationships with one another. A positive correlation coefficient (r -value) indicates a strong or positive relationship among the variables. None of the variables showed a negative/reverse relationship. All variables constituting the six factors indicated strong inter-item correlation. The variables with the highest positive r -value (strongest positive relationship) were found in the marketing/sales factor/function (0.8031), while the variable with the lowest positive r -value (weakest positive relationship) were found in the manufacturing/operations factor/function (0.1137). The complete correlation matrix falls beyond the scope of this article.

ANOVA

The purpose of this analysis is to investigate the relationship between the independent variables (classification data) and dependent variables (six business functions/factors) and to test the stated hypotheses. The ANOVA was calculated for all 42 hypotheses to determine whether there are statistically significant relationships. Only the 13 hypotheses indicating statistically significant relationships are reported. The results of analysis of variance tests with significant relationships are given in Table 6.

The ANOVA results clearly indicate the statistically significant relationships between the independent variables (classification data) and dependent variables (business functions). The null hypotheses (H_{0_1} to $H_{0_{13}}$) can in all cases be rejected. H_{0_1} to H_{0_3} fall within the rejection region ($p < 0.05$ and large F-statistic values), which indicates that there is a significant relationship (difference) between size of business, position occupied and years involved in green practices, and the *manufactur-*

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Table 6: Analysis of variance for the business functions and the independent variables (classification data)

Independent variables	Dependent variables	Df	F-test	P-value	Hypotheses
Size of business	Manufacturing/operations function	3	6.851	0.001	HO ₁
Position occupied in business	Manufacturing/operations function	5	5.080	0.000	HO ₂
Years involved in green practices	Manufacturing/operations function	5	4.466	0.001	HO ₃
Size of business	Marketing/sales function	3	8.448	0.000	HO ₄
Position occupied in business	Marketing/sales function	5	8.385	0.000	HO ₅
Years involved in green practices	Marketing/sales function	3	4.422	0.001	HO ₆
Size of business	Purchasing/supply chain function	3	7.813	0.000	HO ₇
Size of business	Distribution/logistics function	3	8.845	0.000	HO ₈
Years involved in green practices	Distribution/logistics function	5	5.974	0.000	HO ₉
Type of industry	Finance/information technology function	8	3.603	0.001	HO ₁₀
Size of business	Finance/information technology function	3	6.562	0.000	HO ₁₁
Years involved in green practices	Finance/information technology function	5	3.810	0.002	HO ₁₂
Size of business	General management / Human resources function	3	14.289	0.000	HO ₁₃

Note: p < 0.05

ing/operations function (H₁ to H₃ accepted). The null hypotheses, HO₄ to HO₆, can also be rejected and the research hypothesis, H₄ to H₆, can be accepted, indicating that there is a significant relationship between the size of a business, position occupied and years involved in green practices, and the *marketing/sales function* (p < 0.05). The null hypothesis, HO₇ is also rejected, based on the F-statistic of 7.813 and P-value of 0.000. There is a highly significant relationship (difference) between the size of a business and the *purchasing/supply chain management function* (H₇ accepted). HO₈ and HO₉ can also be rejected, based on the high F-statistics and P-values (p < 0.01). The research hypothesis, H₈ and H₉, can be accepted: there is a significant relationship between the size of a business and years involved in green practices

and the *distribution/logistics function*. $H_{0_{10}}$ and $H_{0_{12}}$ can be rejected ($p < 0.05$) and the research hypothesis, H_{10} and H_{12} , can be accepted. There is a highly significant relationship (difference) between type of industry, the size of a business and the number of years involved in green practices, and the *finance/information technology functions*. $H_{0_{13}}$ can also be rejected, as there appears to be a significant relationship (difference) between the size of a business and the *general management/human resources functions* (F-statistic of 14.289 and P-value < 0.01). The research hypothesis, H_{13} , can be accepted.

Further post-hoc tests (for example, Scheffé's test) were conducted, but not reported, as this is an exploratory study and the results of such tests fall beyond the scope of this article. Figure 2 indicates the possible relationships between the independent variables (classification data) and dependent variables (business functions), based on the hypotheses formulated and tested in this study. No relationship exist between the classification data (independent variables): functional area employed, ethnic group, and age, and the business functions (dependent variables).

Conclusions and recommendations

The following conclusions and recommendations are provided based on the literature study conducted:

- Manufacturing/Operations function: Businesses should apply green principles by using their resources more efficiently. This can be done by creating byproducts to eliminate waste and intensifying production processes to reduce environmental impacts while lowering the cost of inputs and waste disposal. Businesses should consciously avoid actions that can cause changes to the climate, water infrastructure and forestry, and rather make use of alternative energy sources. Businesses should have a recycling, re-use and waste policy. Using green technology and reducing the impact of facility construction and operation could increase productivity and ensure that a business remains competitive.
- Marketing/Sales function: Businesses must sell only green products and use only green packaging for products. This type of approach would show that a business is environmentally friendly and could lead to new market opportunities, as well as developing a reputation for supplying green products. Green businesses should have a brand that is valued by customers. Advertising positive environmentalism is not enough, as businesses should be able to honour their promises. There is a need to continually advertise green products to increase customer awareness of the impact and benefits thereof. Furthermore, businesses should be committed to investing in green research and development initiatives.

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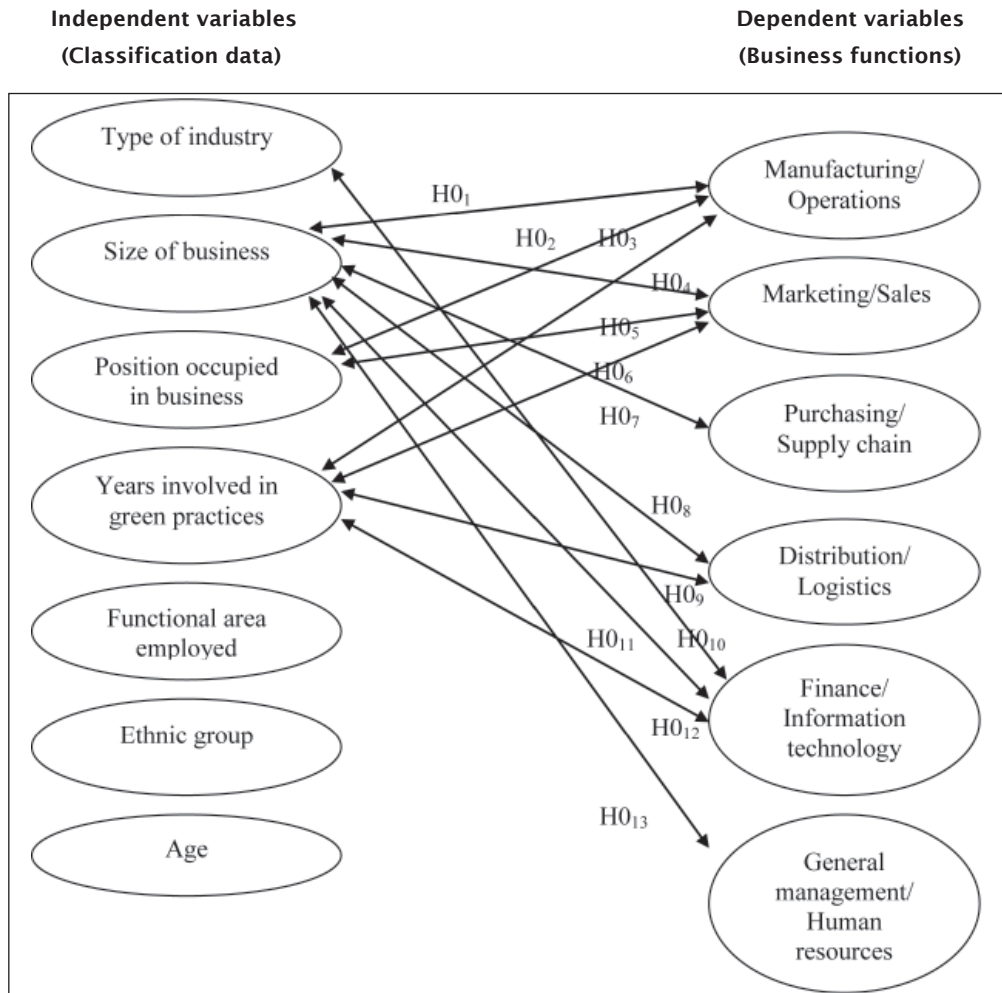


Figure 2: Possible relationships between the dependent and independent variables

- **Purchasing/Supply chain management function:** Businesses should purchase from suppliers selling environmentally friendly products and ensure that all businesses in the supply chain meet environmental certification standards. Furthermore, businesses should know the impact of suppliers on the environment prior to purchasing (in that suppliers should comply with ISO 14000 certification). Using a green supply chain could result in increased market share and profitability despite higher production costs.
- **Distribution/Logistics function:** Businesses should use space-saving warehousing or storage facilities that cut costs and reduce the impact on the environment.

Green warehousing requires considering the construction materials used, as well as considering heating and cooling facilities and using natural light. Biofuels could be used for the transportation fleet to reduce carbon emissions, which are harmful to the environment. Furthermore, businesses should make sure that containers used for transport are at full capacity to reduce transport trips, or try to limit the number of transport trips. In an effort to become greener, alternative means of transport could also be used. Another option is to share a warehouse facility or transportation network to avoid traffic congestions and overcrowding.

- **Finance/Information technology function:** Businesses must institute green accounting policies such as moving to a paperless administrative environment and taking part in socially responsible investment. A green business audit is recommended to ensure that green business standards are met so as to avoid penalties, fines and legal cost associated with non-compliance with green legislation. Accountants should be made more aware of the financial risks linked to environmental damage.
- **General management/human resources function:** There is a need for green human resource policies to cultivate a green business culture. A formal team should be appointed to monitor and promote green issues and conduct a green audit to ensure that standards are met. Businesses should feel ethically compelled to adopt green practices and be encouraged to participate in community programmes. Stakeholders' expectations regarding selling or producing eco-friendly products must also be taken into consideration.

The study showed that the functions least impacted by green business practice implementation are general management/human resources, purchasing/supply chain management and finance/information technology. It is recommended that general management and human resource management functions should be the drivers for implementing green business strategies. Management and other employees of the business should become enthusiastic about greening all the business functions. Businesses should consciously strive to use resources more efficiently in the manufacturing/operations function and distribution/logistics function, as this could give businesses a competitive advantage that could positively impact the marketing/sales function.

This study empirically investigated the relationships between the impact of green practice implementation on six business functions (dependent variables) and seven classification data variables (independent variables). The following conclusions and recommendations can be drawn, based on the analysis of variance between these variables and the hypotheses tested:

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- There appears to be a significant relationship between perceptions regarding the impact of green practice implementation on the *manufacturing/operations* and *marketing/sales function* and the following classification data variables: *size of a business; position occupied; and years involved in green business practices* ($H0_1$ to $H0_6$ rejected). Differences exist between smaller and larger businesses' perceptions regarding the impact of green practice implementation on the manufacturing/operations and marketing/sales functions. It is understandable that small businesses will find it more risky and costly to implement green business practices in the manufacturing/operations and marketing/sales functions. The greening of the manufacturing/operations and marketing/sales function should be pursued, irrespective of the size of the business – even in small businesses and not only for larger businesses. It appears that owners, co-owners, managers and employees have different perceptions regarding the impact of green practice implementation on the manufacturing/operations and marketing/sales function. The greening of these functions should be encouraged and supported by all levels of employees in the business. Employees with different numbers of years of involvement in green practices also have different perceptions regarding the impact of these practices on the manufacturing/operations and marketing/sales functions. The more employees become involved in green practices, the more likely that they would have developed positive attitudes towards it. Policies and practices should be in place as to ensure that all employees become involved in greening the manufacturing/operations and marketing/sales functions in a business – this is not the responsibility of top management alone.
- Significant relationships exist between perceptions regarding the impact of green practice implementation on the *purchasing/supply chain function* and the *size of a business*. ($H0_7$ rejected). No relationships exist between this function and the other data classification variables. It thus appears that businesses of different employment sizes (small, medium and large) have different perceptions regarding the impact of green practice implementation on the purchasing/supply chain function. It is therefore suggested that all businesses, irrespective of employment size, engage in green purchasing/supply chain management. Especially in smaller businesses, dedicated efforts should be made to ensure greener purchasing, even though it is more costly in the short term, as it may be beneficial in the long term.
- It was found that significant relationships exist between perceptions regarding the impact of green practice implementation on the *distribution/logistics function* and the *size of a business* and the *number of years involved in green practices* ($H0_8$ and $H0_9$ rejected). The larger a business, the bigger its distribution/logistic needs. A business's distribution/logistics needs change the longer it is involved in green

practices. Businesses of all employment sizes should encourage green distribution/logistics practices. It is often assumed that only larger businesses should engage in such practices. The more employees become involved and experienced in green distribution/logistics practices, the more positively it could influence their perceptions about these practices. Various policies and practices should be instituted so as to ensure the greening of the distribution/logistics function.

- The perceptions regarding the impact of green practice implementation on the *finance/information technology functions* showed significant relationships with the following classification data variables: *industry type*, *employment size* and *years involved in green practices* ($H0_{10}$ to $H0_{12}$). Of all the business functions, it appears that only the perceptions regarding the impact of green practice implementation on the finance/information technology functions are related to the type of industry. Businesses operating in different types of industries tend to have different perceptions regarding the impact of green practices on the finance/information technology functions. Greening aspects of these functions thus appear to be industry-specific. Businesses operating in the same industry should therefore attempt to comply with more or less the same type of greening practices and initiatives. It is suggested that all businesses, regardless of employment size or years involved in green practices, engage in green finance/information technology.
- There appears to be a significant relationship between perceptions regarding the impact of green practice implementation on the *general management/human resources function* and the *size of a business* ($H0_{13}$ rejected). Small businesses have fewer employees and might not have the staff or knowledge of how to go about implementing green business practices. Employees of businesses with different employment sizes tend to have different perceptions regarding the impact of green practices on the general management/human resources functions. Greening practices and issues regarding these functions should be implemented in businesses of all employment sizes. No relationships exist between these functions and the other data classification variables.

Table 7 provides some general guidelines and recommendations for greening the business functions, based on some the variables used in the questionnaire.

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Table 7: Guidelines and recommendations for greening the business functions

	Greening of manufacturing/operations function:
1	Prioritise the reduction of the impact of facility construction and operation.
2	Use resources more efficiently.
3	Create byproducts, recycle and re-use to eliminate waste.
4	Intensify production processes to reduce environmental impacts while lowering the costs of inputs and waste disposal.
5	Consciously avoid actions causing changes to the climate, water infrastructure and forestry.
6	Use alternative energy sources in production and manufacturing processes.
7	Use green technology to remain competitive and increase productivity.
	Greening of marketing/sales function:
1	Use green initiatives to attract new market opportunities.
2	Use only green packaging for products.
3	Be committed to investing in green research and development initiatives.
4	Use green marketing to make customers aware of environmentally friendly business.
5	Sell only green products.
6	Ensure brand loyalty by being an environmentally friendly business.
7	Honour commitments by advertising positive environmentalism.
8	Continually remind customers in advertisements of eco-friendly products.
9	Develop a reputation for supplying eco-friendly products.
	Greening of purchasing/supply chain function:
1	Assess the impact of suppliers on the environment prior to purchasing.
2	Ensure that all businesses in the supply chain meet ISO 14000 standards.
3	Purchase only from suppliers selling environmentally friendly products.
4	Produce/supply eco-friendly products in spite of higher production costs.
	Greening of distribution/logistics function:
1	Use space-saving warehousing or storage facilities to reduce environmental impact.
2	Have a 'green' warehouse in terms of the construction materials used, heating and cooling facilities.
3	Use biofuels in transportation fleet and limit the number of distribution trips to reduce the carbon footprint.
4	Use alternative means of transport to make transport efforts greener.
5	Use containers at full capacity to reduce the number of trips to distribute products.
6	Share warehouse facilities/transportation networks to avoid traffic congestions and overcrowding.
	Greening of finance/information technology function:
1	Institute green accounting policies.
2	Take part in socially responsible investing (SRI).
3	Avoid penalties, fines and legal costs for non-compliance with environmental legislation.
4	Expand the use of sustainable paper products while reducing the use of paper.
5	Complete a green business audit to ensure that green business standards are met.
	Greening of general management/human resources function:
1	Produce or sell eco-friendly products according to stakeholders' needs.
2	Implement green human resource policies to cultivate a green business culture.
3	Support community action programmes (for example, to make use of reusable containers).
4	Ensure top management support in all green initiatives.
5	Complete a green audit of employee activities to ensure that green business standards are met.
6	Establish a formal team of people to monitor and promote green issues.

Limitations of the study

The following limitations of this study are acknowledged:

- A convenience sample was drawn from the target population in the Nelson Mandela Metropole, which could have impacted on the representativeness of the sample.
- Mainly small and medium-sized organisations were included in the sample. Larger businesses might have different perceptions regarding the impact of green practices on the business functions.
- Given that the functions were grouped, it is possible that one of the functions in the group could have implemented more green business practices than another function, thereby possibly influencing the final results.
- Although the majority of respondents were employees/managers, more than a third of the respondents were owners or co-owners; the latter might have different perceptions regarding the impact of green practice implementation on the business functions.

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