

The antecedents and the impact of environmental commitment in Australian Wine Industry

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Franz Carrillo-Higueras

ABSTRACT

As a result of societal environmental concerns, organisations are being pushed to adopt environmental protection in their strategies and policies. In this context, it has been observed that organisations commit to the environment to different extents. Many reasons have been proposed to explain these differences, reasons that are of great relevance for groups such as governments, communities and environmental groups, since this knowledge would make it possible to positively encourage managers, guiding, educating and promoting environmental change instead of compelling it.

Among the reasons that explain the differences in the ways in which organisations commit to the environment, stakeholders' pressures are the most widely studied in the environmental management literature. However, stakeholders' pressures are unable to explain differences in environmental commitment in organisations that are similar in size, profits and in the same industry.

Other branches of literature offer additional explanations. Behavioural literature proposes that the way management teams perceive environmental commitment can be a strong predictor of the organisational adoption of this commitment, a focus that has not received adequate attention in the literature. The main motivation of this research is therefore to analyse the effect of managers' perceptions (attitudes, perceptions of control, and perceptions about stakeholders' pressures) as predictors of the organisational behaviour of adopting an environmental commitment, using the Theory of Planned Behaviour as guidance. In addition, this research examines the relationship between information scanning about environmental issues and managers' perceptions, and the relationship between environmental commitment and organisational outcomes, particularly environmental performance. This was developed by studying a sample of 184 wineries in Australia. The wine industry is a good example of an industry that wishes to project an environmentally conscious image, but one that also struggles greatly with issues such as herbicides, pesticides and water management.

The main findings of this research are summarised as follows. First, this study found a positive relationship between environmental commitment and environmental performance, which highlights the importance of understanding the predictors of environmental commitment. Second, the attitudes and perceptions of control, which are internal factors, are the most relevant drivers of environmental commitment, whereas stakeholders' pressures are less relevant for managers. Third, positive relationships were found between information scanning and attitudes, perceptions of control and perceptions about stakeholders' pressures, which highlight and reinforce the importance that information scanning has for management teams in conceptualising environmental commitment in terms of opportunities for the organisation.

ACRONYMS LIST

ATO: Australian Taxation Office

ATT: Attitudes

AVE: Average Variance Extracted

CFA: Confirmatory Factor Analysis

CFI: Comparative Fit Index

CTRL: Perceptions of Control

DSE: Victorian Department of Sustainability and Environment

EC: Environmental Commitment

EP: Environmental Performance

GI: Geographical Indication

GOF: Goodness-of-fit

IFI: Incremental fit indices

INF: Information Scanning

MANOVA: Multivariate analysis of variance

NSW: New South Wales (NSW)

QLD: Queensland

RMSEA: Root Mean Square Error of Approximation

SA: South Australia

SEM: Structural Equation Modelling

SRMR: Standardized Root Mean Residual

STK: Stakeholders

TAS: Tasmania

TPB: Theory of Planned Behaviour.

VIC: Victoria

WA: Western Australia

WFA: Winemakers' Federation of Australia

WGGA: Wine Grape Growers Australia

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Chapter 1

1. Introduction

1.1 Research Background

There is a general consensus that organisations dedicated to produce goods have important responsibilities in regard to the deterioration of the environment (Horrigan et al., 2002; Goudie, 2013). From this point of view, the concept of organisational environmental commitment has gained visibility and exposure in academia (the environmental management literature) and in industry. Organisational environmental commitment is the way in which the organisation engages with policies, practices and strategies to define its behaviour towards the natural environment (Mintzberg, 1989; Henriques and Sadosky, 1999; Sharma, 2000; Sarkis et al., 2010). Some examples of these practices are recycling, substitution of toxic and pollutant raw materials or waste reduction.

When making an environmental commitment decision, organisations can choose between a wide continuum of options depending on the extent to which they want to address their environmental deficiencies and the consequent degree of adoption of environmental practices. Low levels of environmental commitment tend to involve a low extent of adoption of environmental practices, whereas higher levels of environmental commitment involve deeper levels of concern, which leads managers to increase the extent of adoption of environmental practices (Henriques and Sadosky, 1999). This latter end of the continuum involves voluntary effort and willingness to increase the number of environmental problems addressed, which usually represent higher levels of investments (Henriques and Sadosky, 1999; Sharma, 2000), such as through the installation of solar panels, or the acquisition of new technologies for watering crops, saving water and other resources.

As a result of incremental growth in societal environmental awareness, efforts are being made to encourage organisations to include environmental protection in their strategies and policies. It would therefore be useful to identify the factors that make organisations commit to the environment and the degree to which they do so. Consequently, the question of central importance, and the one to be examined in this study, is:

What are some of the causes for managers to adopt different levels of environmental commitment in their organisations?

Understanding the reasons that cause organisations to adopt different levels of environmental commitment is of the utmost relevance for several groups in society, such as governments, communities and environmental groups. Greater knowledge in this area would mean that it becomes possible to apply the right incentives and encouragement to organisations to guide them in the improvement of environmental care. In the same way, regulations could be improved and directed to promote commitment to the environment, conducting, guiding and supporting organisations instead of purely obligating them.

1.1.1 Environmental performance

It is important to highlight that when organisations adopt a certain level of environmental commitment, they are aiming to improve their environmental performance. This means that what governments, regulatory institutions and other stakeholders are searching for are organisations capable of obtaining evident improvements in areas such as pollution reduction, energy and water conservation, and overall recycling rates, as measured by concrete environmental indices, rather than engagement with particular practices but without any such measurement. Therefore before addressing some of the reasons that might be causing organisations to commit to the environment in different extents, it

seems necessary to analyse the relationship between environmental commitment and environmental performance, since the strength of this relationship would provide a valuable insight about the true role of organisational environmental commitment in the improvement of the organisational environmental outcomes.

The rationale that explains the relationship between environmental commitment and environmental performance is as follows. Better levels of environmental commitment usually involve a higher degree of adoption of environmental practices in the organisation, which could lead to the improvement of environmental performance indices. This thesis will discuss that most environmental practices are oriented to prevent and diminish pollution, encouraging also production efficiency, which leads to produce using fewer inputs (raw materials, energy, water) and, consequently, polluting less. These characteristics would allow organisations to decrease wastes and pollution, improving environmental performance indices. Therefore, the first objective of this study is to examine the relationship between environmental commitment and environmental performance in order to understand the extent to which a certain environmental commitment adopted by an organisation is having the desired effects in environmental performance indices.

Objective 1: to examine the relationship between environmental commitment and environmental performance.

1.1.2 The role of the perceptions of the management team in the adoption of environmental commitment in the organisation

The next step in this research is to understand the reasons that cause organisations to adopt different levels of environmental commitment. As a first approach, one might hypothesise that the root of these differences is produced by factors such as the cost

involved in environmental initiatives (which might be assessed as prohibitively expensive by the management team) or by differences in the level of pressures to which the organisation is exposed, and this is indeed true to a certain extent. However, organisations do have large differences in their levels of environmental commitment, even in cases where they belong to the same industry and are exposed to the same level of environmental pressures. Indeed, many organisations with different levels of environmental commitment are similar in size, in profit levels and are even closely located geographically (Henriques and Sadorsky, 1999; Buysse and Verbeke, 2003). Therefore, although being important factors, costs and external pressures do not appear to explain completely the differences found in environmental commitment.

There are branches of literature that propose other explanations for these differences. Behavioural literature, for example, suggests that factors that are part of the individual's personality, such as the way in which the individual perceives his or her surroundings, can affect his or her performance of behaviours (Fishbein and Ajzen, 2010). Thus, considering that the adoption of a level of environmental commitment in the organisation can be considered as an organisational behaviour (Cordano and Frieze, 2000; Papagiannakis and Lioukas, 2012; Rivera-Camino, 2012), and that organisational strategic decisions, such as environmental commitment, depend on individuals, and specifically on the members of the management team, who are the most important decision makers in organisations (Thomas et al., 1993; Sharma, 2000; Prakash, 2001; Bansal, 2003), it seems reasonable to propose that the way in which they perceive environmental issues is going to play an important role in the level of environmental commitment adopted by the organisation.

Perceptions are the elements by which managers shape and understand the signals and information that they receive from their surroundings (Taylor and Fiske, 1978; Smart and Vertinsky, 1984; Thomas et al., 1993), affecting their process of decision making and the performance of organisational behaviours in areas such as the adoption of a certain level of environmental commitment. In particular, behavioural and management literature

suggest that organisational behaviours are affected by first, managers' personal assessment of the behaviour (in positive or negative terms), and second, by perceptions about the extent of controllability that managers feel they have over the behaviour (Jackson and Dutton, 1988; Thomas and McDaniel, 1990; Thomas et al., 1993). In addition, the environmental management literature highlights the importance of stakeholders' pressures as driver for environmental commitment (Henriques and Sadosky, 1999; Buysse and Verbeke, 2003; Gonzalez-Benito and Gonzalez-Benito, 2006; Garvare and Johansson, 2010; Sarkis et al., 2010).

The theory of planned behaviour (TPB) (Ajzen, 1991) addresses these elements as predictors of behaviour, in one single framework. The TPB has been used successfully in the past in modelling the link between an individual's perceptions and his or her intention of performing behaviours (Bernath and Roschewitz, 2008; Flannery and May, 2000), but, more importantly, it has recently started to be used as a link between the way that management teams perceive strategic issues and the effect on organisational outcomes, such as in the case of environmental commitment, (e.g. Cordano and Frieze, 2000; Papagiannakis and Lioukas, 2012; Rivera-Camino, 2012). Therefore, it is used as main guidance in the development of this study. The advantage of addressing these drivers in one single framework is that it allows examining and comparing their strength as predictors of environmental commitment.

Hence, the second point to research is:

Objective 2: to examine and compare the strength of the predictors of environmental commitment (perceptions of environmental commitment in positive or negative terms, perceptions of control on this commitment and perceptions about significant others' opinions).

1.1.3 The role of information on shaping the perceptions of the management team

Given that the perceptions of the management team could affect the performance of behaviours such as the adoption of environmental commitment in organisations, this study also researches the way that information about environmental issues affects the process of shaping of the perceptions of the management team. Environmental requirements are relatively new for organisations (Sharma, 2000; Sroufe et al., 2002) and management teams need information in order to shape suitable responses that can benefit the environment and their organisation. The process of information scanning, which considers the gathering and analysis of information, is normally performed by the management team with different levels of interest and emphasis, resulting in differences in the results obtained through this process. This means that there are organisations facing strategic decisions with different levels of information. Some studies have suggested that the amount of information about the natural environment and the way in which the management team scan for it could affect the perceptions of the management team about environmental issues (Kaiser and Shimoda, 1999; Maheran et al., 2009), which is an argument that might explain part of the differences found in the adoption of levels of environmental commitment in organisations. Therefore, this study examines the effect of information scanning on the perceptions of the management teams (the drivers of commitment proposed by the TPB) that are capable of affecting the adoption of environmental commitment in organisations. Therefore, the third objective of this research is:

Objective 3: to examine the relationships between information scanning and the drivers of environmental commitment (perceptions of environmental commitment in positive or negative terms, perceptions of control on this commitment and perceptions about significant others' opinions).

1.2 The Australian Wine industry

The industry chosen for this research is the Australian wine industry. The wine industry constantly strives to demonstrate and project a “green” image, but, in a fashion similar to other agricultural industries, it struggles with problems such as water and energy consumption, pollution emissions, use of fertilizers, herbicides, insecticides and pesticides, pollution, waste generation and soil degradation (Beccali et al., 2009; Gabzdylova et al., 2009; Hillier, 2009), all of which are impacting negatively on the natural environment.

The wine industry also represents a field with high rates of innovation and introduction of new technologies (Giuliani and Bell, 2005; Bell and Giuliani, 2007), which makes it a good area in which to explore the issues discussed above that are related to environmental commitment.

Wineries affect the environment in several areas. The wine industry is a subset of the agriculture industry, a sphere of activity that has been recognised as one of the most energy-consuming, representing 20% of the total energy consumption in places such as the USA and Europe (Reinders et al., 1995; Wilhite et al., 1996; Brower and Leon, 1999). In addition, water consumption is one of the biggest environmental problems faced by the wine industry (Gabzdylova et al., 2009). Vines can consume up to 12 litres of water daily, and, in addition, there is substantial water use associated with the cleaning and sanitation of the bottling lines and vessels, as well as the water required to cool the fermentation process. Some authors have estimated that 5 litres of water are required for producing 1 litre of wine (McBride, 1998). Furthermore, there are issues related to water shortages in certain regions of Australia which make this situation particularly problematic. The use of chemical pesticides and fertilisers is another important problem, since they negatively affect animals, workers and neighbours in the vicinity of vineyards. These chemicals can also affect underground sources of water, which extends the

negative effects to other areas (Silverman et al., 2005). Another source of pollution is the direct use of fossil fuels in farm vehicles and equipment (Silverman et al., 2005). During wine making, the environmental impact is mostly related to energy consumption and the treatment and disposal of wastes. Energy is mainly used for controlling the temperature during fermentation processes, for running machinery and for cleaning. Water pollution is also an important issue, since the cleaning of tanks and equipment is performed very often (usually after every time wine is produced). Wastewater that originates in wineries is highly acidic and produces unpleasant odours, and it is difficult to treat and not suitable for watering crops like vines (Gabzdylova et al., 2009). Inputs and packaging materials, such as bottles, plastics, pesticides containers, old netting, irrigation lines, boxes and corks represent an important source of waste. Chemical issues can impact on the environment through spills and wastes, affecting the air, water and soil (Silverman et al., 2005). Additionally, for geographically isolated countries such as Australia, the transportation of goods to the major markets of America and Europe has become increasingly important, because of the associated emission of greenhouse gases. Consequently, any environmental improvement in wineries' practices is to be highly valued (van der Werf and Petit, 2002).

There are also important economic reasons that support and encourage the study of this industry. The Australian wine industry is located in the top ten of the most important worldwide producers, contributing significantly to the Australian economy, and has more than 31,000 employees (Winetitles, 2013). The Australian wine industry is mainly oriented to exports: in 2012, 65% of total production was destined for external markets, with the UK and the USA being the most important destinations (Winetitles, 2013).

These reasons make the wine industry an ideal area for seeking to understand the way in which management teams take a stand on environmental issues, the way that their perceptions about these problems affect the level of commitment reached by their wineries, and how information about the environment and the consequences of pollution

can make these perceptions vary. Furthermore, Australian wineries tend to be small in size, and usually management teams are reduced to just one single person, the owner of the winery. This means that the perceptions studied by this research are commonly associated to the owner of the winery.

1.3 Rationale of this research

The study of the effects of managers' perceptions on organisational outcomes has received little attention in the management literature. Most previous studies have centred their attention on economic, technological, regulatory and organisational issues, along with stakeholders' pressures as the most important drivers of environmental commitment (e.g., Henriques and Sadorsky, 1999; Sharma, 2000; Buysse and Verbeke, 2003). However, it has also been stated that there is a need to pay more attention to elements that come from the human dimension, such as perceptions, feelings and values, and the level of impact that they can have on organisational outcomes (Bansal and Gao, 2006), since managers are the ones that define the direction and the extent to which organisations commit to the environment (Bansal, 2003; Prakash, 2001; Papagiannakis and Lioukas, 2012; Rivera-Camino, 2012).

This study addresses the drivers of environmental commitment from the perspective of perceptions, using the TPB as guidance, and extending the focus of this theory by including the elements of information scanning and environmental performance. Information scanning is studied in its role of likely predictor of the elements of perceptions proposed by the TPB, since early studies have suggested that information can affect the way perceptions are shaped (Hambrick, 1982; Daft and Weick, 1984; Thomas et al. 1993; Sharma, 2000; Kuvaas, 2002). This study also includes the relationship between the level of environmental commitment adopted by organisations and their environmental performance.

The elements previously described have been studied mostly in isolation, whereas the present research considers all of them within the same framework. The fact of addressing these elements in a single model allows, first, to assess their relationships using the responses of the same sample. Second, it allows to benchmark the effect of the three elements proposed by the TPB at the same time, which means that the present study can identify what is (are) the element(s) of perception that most significantly affect(s) environmental commitment in this industry.

As another important aspect to mention is that, while environmental commitment has been addressed by other studies, it has been done predominantly in industries that traditionally have been in the media spotlight, such as mining, energy and forestry (Henriques and Sadorsky, 1999; Buysse and Verbeke, 2003; Gonzalez-Benito and Gonzalez-Benito, 2006; Garvare and Johansson, 2010; Sarkis et al., 2010), because they alter the physical environment in a more visible way (e.g., subsidence and erosion in mining industry, deforestation in forestry industry and flooding, in hydroelectric plants, or heavy air pollution in thermoelectric plants). Although wineries might generate less visual impact on the environment, they still could pose a significant threat, an issue that has been very inadequately considered in literature. In addition, studies that have addressed environmental issues in wineries have been undertaken in countries such as New Zealand and the USA, overlooking Australian wineries. The Australian wine industry deserves to be studied in its own context, since it is one of the most important in the world in terms of production, and, in addition, the perceptions of the management teams change, depending on the culture of the area or region (Chiu et al., 2010). This gap is addressed by the present study, taking into account data collected from wineries located in several Australian states, in order to understand the importance that stakeholders, environmental commitment and information have for management teams in wineries.

1.4 Description of methods

The present study collected and analysed quantitative data obtained from a sample of Australian wineries. The first stage considered the selection of a pool of wineries, from the Wine Industry Directory (2011), which make wine on-site, since these wineries tend to be larger in size and to have a certain level of concern about the environment (Sharma, 2000). Data collection was based on an on-line survey, which was intended to facilitate the process of response. The survey contained several items measuring constructs that were developed based on the TPB and studies about information scanning, and it was tested first through a pilot study on some wineries in the Yarra Valley, Victoria, Australia. The collected data were analysed by applying the two-step SEM approach (Anderson and Gerbing, 1988), which consists in the analysis of the fit and construct validity of the proposed measurement model, using Confirmatory Factor Analysis, and continues with the analysis of the structural model, testing the relationships between the different variables.

1.5 Assumptions and limitations

This study has some general limitations that are common issues for the methodology followed in this research. First, the design of this study (which is cross-sectional) is a single observation at a specific moment in time, which does not allow for comparison of results over a time continuum and makes it difficult to test causal relationships. Second, the data collected from wineries was self-reported by managers, and therefore, this research relies on their perceptions and honesty in providing trustworthy information. These data represent their perceptions about how the management team in the winery acts, feels and perceives. Finally, although some of the conclusions of this research could be generalizable to other industries, the results are focused on the Australian wine

industry, and also, potentially, could be useful to other organisations belonging to the agriculture sector.

1.6 Structure of this thesis

The thesis is structured in six chapters: Introduction, Literature Review, Research Methods, Data Analysis, Findings and Conclusions. A brief description is presented below.

Literature Review: The literature review chapter describes the theory used as a framework for this research. It describes the concepts of environmental commitment and environmental performance, along with their relationship. The TPB is presented, together with the three drivers of behaviour: an individual's attitudes, perceived norms and perceptions of control. Then the relationships between environmental commitment and its drivers are presented using the TPB model as a guide. The next element to describe is information, addressing the topic of how information scanning can affect the drivers of environmental commitment. This chapter also presents the hypotheses that are researched in this study and the study's research model.

Research Methods: This chapter starts by defining the variables used in the research model and the way they were developed. The chapter then outlines the process of data collection, the building of the survey instrument and the performance of it in the Australian wineries are described. The last part of this chapter is dedicated to describe the statistical techniques used to analyse the data once collected.

Data Analysis: This chapter describes the sample, including the location of respondents, the number of employees in the wineries, the tonnes of grapes crushed and the position held by respondents. The chapter explains how data analysis was undertaken, the

application of Confirmatory Factor Analysis, the analysis of the Structural Equation Model and the way in which the process of hypothesis testing was done.

Findings: The chapter discusses the results obtained from data analysis, reporting the hypotheses that were accepted or rejected. It examines the effect and the strength of the predictors of environmental commitment, describing some of the consequences of these results for the wine industry. Theoretical and practical implications are also presented.

Conclusions: This final chapter summarises the main findings from the research, outlining the limitations and making recommendations for further research.

Chapter 2

2. Literature review

2.1 Introduction

The protection of the environment has motivated several important actors in society to propose and request changes from companies and organisations in order to change their behaviour to reduce their impact on the natural environment. These environmental requirements are partially addressed by organisations improving their current environmental practices or adopting new ones, which means adopting higher levels of environmental commitment of the organisation (Henriques and Sadorsky, 1999). In general terms, organisational environmental commitment is defined as the set of all the practices, policies and strategies engaged by the organisation associated with environmental protection (Gonzalez-Benito and Gonzalez-Benito, 2006). The main objective of the present study is to analyse the antecedents that affect the adoption of different levels of environmental commitment in organisations, along with examining their effects on environmental performance. This study will research these elements within the Australian wine industry and this literature review will set the theoretical framework needed in order to identify and understand these variables.

Environmental commitment adopted by organisations has traditionally been studied by branches of literature associated with stakeholder theory. Stakeholder theory proposes that the main drivers for environmental change are stakeholders such as consumers, regulatory institutions, employees, shareholders and owners (Henriques and Sadorsky, 1999; Murillo-Luna et al., 2008; Sarkis et al., 2010). It has also been found that the perceptions of management teams can have an effect on the level of environmental commitment adopted by the organisation (Papagiannakis and Lioukas, 2012; Rivera-Camino, 2012).

The theory of planned behaviour (TPB) (Ajzen, 1991) provides a focus capable of integrating the drivers of environmental commitment and can be used also to assess the perceptions of top managers in organisations. The TPB argues that behaviours such as making an environmental commitment can be predicted by an individual's attitudes towards this commitment, perceived norms (stakeholders) and perceptions of control over the behaviour (Fishbein and Ajzen, 2010). The importance of this theory is that it includes the individual's feelings and perceptions in the equation, claiming that, unlike the underlying premise of stakeholder theory, perceived norms (the individual equivalent of organisational stakeholders) as an isolated element may not be enough to produce change. It is stated that top managers' perceptions are also necessary to interpret numerous issues in the organisation (Papagiannakis and Lioukas, 2012; Rivera-Camino, 2012), and even perceived norms must be first interpreted and processed by managers, making sense of them in order to adopt the most suitable responses (Cordano and Frieze, 2000; Papagiannakis and Lioukas, 2012).

In addition, studies examining organisational environmental commitment using the TPB as a framework agree that there are some other important elements and antecedents outside of the theory capable of affecting managers' interpretations and behaviours (Papagiannakis and Lioukas, 2012; Rivera-Camino, 2012). One of these important elements is the knowledge and information that top managers collect from their surroundings, along with the practices used to analyse and process this information. Depending on the completeness and diversity of the information collected, and the way managers process this information, their interpretations can be affected or biased to act in different ways towards environmental issues. The amount of information collected and the analysis performed by managers are reviewed in this chapter as the concept of "information scanning effort".

The structure of this chapter will be as follows. In the next section, the concept of environmental commitment and its evolution will be reviewed. The third section will

examine the relationship between environmental commitment and environmental performance. The fourth section will explain the main predictors of environmental commitment, and this explanation will utilise the TPB as a framework. The relevance of TPB as a framework for an individual's behaviours and the way these individual-level predictors affect the level of environmental commitment adopted by the organisation will be discussed. In the fifth section of this chapter, the element of information scanning will be reviewed, explaining the way information can affect the predictors of environmental commitment. The last section will be the conclusion of this chapter.

2.2 Environmental commitment

As a consequence of increased societal concern about environmental preservation, productive organisations have been motivated by different reasons, such as stakeholders' pressures and managers' perceptions, to improve their productive practices in order to reduce the level of pollution generated and diminish their harmful effects on the natural surroundings (Henriques and Sadorsky, 1999; Buysse and Verbeke, 2003; Gabzdylova et al., 2009). The concept of environmental commitment is a central element by which organisations can express and make evident their intentions to engage in environmental protection.

This section will define the concept of environmental commitment adopted in this research. The way environmental commitment has evolved since early studies, how the concept is understood and considered, and how organisations are classified according to it in modern studies will also be discussed.

2.2.1 Environmental commitment: definition and evolution of the concept

For this study, environmental commitment will be considered as organisational engagement with strategies, policies and practices developed over time and aimed to define organisational behaviour towards the natural environment (Mintzberg, 1989; Henriques and Sadosky, 1999; Sharma, 2000; Sarkis et al., 2010). As an example of the practices considered usually in environmental commitment, Gonzalez-Benito and Gonzalez-Benito (2006) classify these policies and practices in three categories:

1. Operational practices, such as substitution of polluting parts and the reduction of inputs and resources in production
2. Planning and organisational practices, considering the creation of environmental policies, definition of environmental responsibilities and employee environmental training
3. Communicational practices, such as environmental reports or sponsoring of environmental events.

Environmental management literature identifies two contradictory theories when studying environmental commitment. The first states that organisations which are part of the same industry will be affected by similar levels of social pressures, and therefore will tend to adopt and to operate at similar levels of environmental commitment (Sharma, 2000, Hoffman, 2001). Conversely, other studies describe organisations as entities with their own characteristics and able to respond to pressures with a wide range of environmental solutions, showing variability in the same industry (Sharma and Vredenburg, 1998; Henriques and Sadosky, 1999; Sharma, 2000; Buysee and Verbeke, 2003; Howard-Greenville et al., 2007; Murillo-Luna et al., 2008). Since there is strong evidence supporting the existence of differences between organisations with regard to environmental commitment (Howard- Greenville et al., 2008), the present study will follow this latter line of research, assuming that differences can be found in companies

belonging to the same industry, despite having similar size and levels of stakeholder pressure.

Acknowledging the approach of variability between organisations, early studies on environmental commitment originally classified this concept simply in two groups, compliance or non-compliance, depending on whether or not the organisation met environmental regulations (Logsdon, 1985). Since then, the worsening of environmental conditions, the improvement of audit practices implemented by governments and regulators, the strengthening of penalties for non-compliance, and the positive influence of other stakeholders, such as consumers and communities, have led organisations to realise that working under a non-compliance framework can become a risk and a threat to the organisation's survival (Henriques and Sadorsky, 1999; Sharma, 2000).

In recognising the limitations of a compliance-based approach, managers began understanding that the adoption of higher levels of environmental commitment can impact positively on natural environmental conditions, and, in addition, can lead to benefits such as financial savings and competitive advantage and even help shape future environmental regulations (Hart and Ahuja, 1997). These reasons encouraged managers to adopt commitments beyond environmental compliance, a tendency that has been reflected by studies describing this behaviour (Hunt and Auster, 1990; Roome, 1992; Hart and Ahuja, 1997; Howard-Greenville et al., 2008). Current studies have researched environmental commitment consistently with this change of attitude in organisations, and there is a general tendency to study environmental commitment assuming compliance with environmental regulations as the minimum level of commitment able to be acquired by organisations (Henriques and Sadorsky, 1998; Buysse and Verbeke, 2003; Sharma, 2000; Murillo-Luna et al., 2008).

Current research considers environmental commitment as a "continuum of internally consistent patterns of environmental practices" (Murillo-Luna et al., 2008, p. 1228).

Organisations located at the lower levels of the environmental commitment continuum are characterised by the adoption of a set of environmental practices that generally need to be further developed and improved for addressing a wider extent of environmental deficiencies (Sharma, 2000; Buysse and Verbeke, 2003; Murillo-Luna et al., 2008). An example of low levels of environmental commitment is the case of wineries which lack environmental practices to diminish water consumption (for example), or which are addressing this issue just partially (for example, acquiring water saving technologies without providing staff training).

Environmental management literature proposes that a common characteristic of organisations with low levels of environmental commitment (close to the compliance end) is the general tendency to make investments just at the end of the productive system, aiming to control rather than to prevent pollution (Hart, 1995; Buysse and Verbeke, 2003). This approach, called “end-of-pipe”, does not tend to encourage the acquisition of state-of-the-art environmental technology, and organisations tend not to be involved in learning, employee training or knowledge development (Sharma, 2000; Sarkis and Cordeiro, 2001; Frondel et al., 2007). The positive aspect of end-of-pipe technologies for productive organisations is that they allow a concentration of effort in producing (Sharma, 2000; Buyssee and Verbeke, 2003). Nevertheless, pollution and emissions must be constantly monitored and the technology updated every time legislation demands stronger control or environmental improvements.

At the other end of the environmental commitment continuum are organisations “which voluntarily make environmental protection a focal point in the creation of competitive advantages” (Murillo-Luna et al., 2008, p. 1228). This means that organisations with higher levels of environmental commitment are better prepared to modify their products and processes in order to diminish their impact on nature, as managers in these organisations recognise that these improvements can lead to gaining competitive advantages, such as consumers’ preferences or the ability of attracting highly trained

employees who prefer working in organisations with high environmental values. In addition, environmental regulations have become more demanding, and organisations capable of predicting future environmental requirements can gain a competitive advantage, since they will enjoy more time to adopt suitable solutions, even becoming referents for other companies, because many of these organisations have worked with governments in the definition of environmental policies and norms (Buzzelli, 1991; Reinhardt, 1999; Buysse and Verbeke, 2003; Garvare and Johansson, 2010). In this sense, it is argued that organisations can be environmentally distinguished from each other by their level of anticipation in foreseeing future environmental needs, and adopting voluntarily different practices and strategies in order to protect the natural environment, usually implementing environmental practices that complement and strengthen each other (Henriques and Sadorsky, 1999; Sharma, 2000; Buysse and Verbeke, 2003; Murillo-Luna et al., 2008).

Organisations with higher levels of environmental commitment strive to reduce their environmental burden in a voluntary way, operating above and beyond legislation and characterized by a pollution prevention focus (instead of reacting) (Sharma and Vredenburg, 1998; Sharma, 2000; Murillo-Luna, et al. 2008). They also undertake and utilise research, learning and new technologies to be able to operate with advanced environmental practices (Sharma, 2000). Organisations highly committed to the environment are expected to adopt practices such as habitat preservation, reduction in fossil fuel consumption, and redesign of practices, products and services in order to pollute less and consume fewer resources, and to adopt environment-friendly technologies (Henriques and Sadorsky, 1999; Banerjee, 2002; Aragon-Correa et al., 2004). A more complete specification of the environmental practices present in organisations highly committed to the environment will be given in the next chapter, section 3.2.5. In between the two extremes of the environmental commitment continuum, there are all kinds of organisations with different levels of environmental commitment, which have adopted environmental practices and policies different in kind and number.

Organisations working with different levels of environmental commitment have received different names in the environmental management literature. Low-committed organisations have been called beginners and fire-fighters (Hunt and Auster, 1990), and reactive and defensive (Henriques and Sadorsky, 1999; Buysse and Verbeke, 2003), reflecting with these names their basic and low involvement with environmental practices. On the other hand, organisations with higher levels of commitment receive names such as “proactivist” (Hunt and Auster, 1990), performers with environmental excellence and leading edge (Roome, 1992), and pollution prevention or environmental leadership (Buysse and Verbeke, 2003), depicting the extent to which these organisations are engaged with more advanced practices. The present study will follow the path of studies such as Gonzalez-Benito and Gonzalez-Benito (2005), Sharma et al. (2007) and Aragon-Correa et al. (2008), which do not classify organisations in categories, but rather accept that environmental commitment is a continuum on which organisations can be placed.

This section has addressed the concept of environmental commitment and the way it has evolved since its early conception. It has also reviewed the way organisations are allocated onto the continuum of environmental commitment and some differences between organisations adopting different levels of environmental commitment. The next section of this chapter will review the effects of the level of environmental commitment adopted on the environmental performance of the organisation.

2.3 Relationship between environmental commitment and environmental performance

The previous section was dedicated to the understanding of the concept of organisational environmental commitment as primary in the reduction of the negative impacts of organisations on the natural environment. Nevertheless, environmental commitment as

an isolated element can be ineffective if it is not complemented by measurements in its development and use. This section will introduce the concept of environmental performance as activities directly influenced by the level of environmental commitment adopted by organisations and able to capture the real effects of this commitment. It is the interest of this research, and in the interest of managers in general, to understand if changes, improvements and additions in environmental commitment are directly and positively associated with the environmental performance of the organisation.

Environmental commitment and environmental performance are two concepts that are considered to be different (Henri and Journeault, 2008; Lopez-Gamero et al., 2009). As stated, environmental commitment addresses all the practices, policies and strategies followed by the organisation in order to decrease pollution and undesired effects on the environment (Mintzberg, 1989). In turn, environmental performance is the result or outcome of the environmental commitment adopted by organisations, and, in the present research, environmental performance is measured using indices that assess the company in terms of water and energy savings, the extent of waste recycling, reduction of solid and liquid wastes and air emissions, and the substitution of harmful inputs, based on the measures used by Klassen and Whybark (1999), Annandale et al. (2004), Lopez-Gamero et al. (2009) and Simpson and Samson (2010).

There are important arguments suggesting that the relationship between environmental commitment and environmental performance is positive. As explained in the previous section, low levels of environmental commitment are usually associated with the adoption of a fewer number of environmental practices which usually are not well developed. Additionally, these measures tend to be temporary, and need to be updated every time environmental regulations change (Sharma, 2000; Sarkis and Cordeiro, 2001; Frondel et al., 2007). Conversely, higher levels of environmental commitment are characterised by the adoption of sets of more sophisticated practices that encourage the improvement of the operational processes in order to prevent pollution instead of

dealing with it once it is already produced (Sharma, 2000; Lopez-Gamero et al., 2009). Solutions involving higher levels of environmental commitment should have a more positive impact on the indices used to measure environmental performance, since generally they involve the adoption of sets of environmental practices that can complement each other (for example, in the case of wineries, practices oriented to save water should include improvements in technology, policies related to the cleaning of the equipment and count on the top managers' support), increasing efficiency in the consumption of resources and inputs, meaning that fewer inputs are required by every item produced (Young, 1991; Schmidheiny, 1992; Link and Naveh, 2006; Lopez-Gamero et al., 2009). As levels of pollution are usually positively associated with the level of inputs and resources used (Young, 1991; Schmidheiny, 1992; Lopez-Gamero et al., 2009), fewer inputs used by an organisation will mean less pollution produced by that specific organisation. As organisations with high levels of environmental commitment tend to have a more comprehensive range of practices oriented to reducing their environmental impact (increased efficiency in input use that implies reduction in wastes and pollution), it is expected they will obtain better results in their environmental performance indices.

Studies examining the relationship between environmental commitment and environmental performance in the area of environmental management generally support a positive association between these two concepts (Herremans et al., 1999; Aragon-Correa and Rubio-Lopez, 2007; Nakao et al., 2007, Lopez-Gamero, 2009). Sugiyama and Imura (1999), for example, describe the effects of improved levels of environmental commitment adopted by Japanese organisations since the 1970s, arguing that these improvements have benefited the population, governments and organisations. The authors describe that, since regulations were not effective in reducing pollution, companies and industrial associations agreed on voluntarily adopting stricter levels of environmental commitment in the areas of water and air pollution, noises and offensive odours, achieving a large success in the indices measuring environmental performance in these areas.

Hart and Ahuja (1996) describe the improvements in environmental performance related to the level of environmental commitment adopted by the 3M Company in the mid-1970s. The focus was to prevent the generation of waste instead of treating it when it had already been generated. In order to do this, 3M asked all staff in the company to be part of an “environmental culture”, where every employee could provide ideas, receive training and be empowered to take decisions in his/her field of work in order to decrease the generation of pollution. Following these proactive environmental practices, 3M diminished pollution generated by 50% between 1975 and 1990. This reduction saved over US\$500 million in items such as disposal, liabilities and raw materials (Hart and Ahuja, 1996). The example of 3M has influenced organisations and academia to consider the idea that a deeper environmental commitment can lead to an improvement in the environmental performance obtained by organisations.

Other studies that also provide empirical evidence about a positive relationship between these two concepts are Lopez-Gamero et al. (2009), which, based on a sample of Spanish organisations, and after asking managers about the extent to which resources were used efficiently, their reduction of emissions, residues and acoustic pollution, determined that cleaner productive technologies are a key point in this relationship. Annandale et al. (2004) studied a number of manufacturing organisations in Western Australia, asking managers about their results in the areas of energy efficiency, protection of watercourses, waste management and noise abatement, determining that the reporting of environmental results to stakeholders and the adoption of environmental control systems lead to improvements in environmental performance in these areas. Melnyk et al. (2003) and Zhu and Sarkis (2004) provide empirical evidence from organisations in North America and China, explaining that companies embracing ISO14001 certifications tend to obtain better environmental results. This occurs because the environmental practices adopted are implemented and executed under a disciplined process of evaluation, committing resources, allocating responsibilities and personnel across the

entire organisation towards this common objective, and assuring that their performance measures and indices are constantly monitored.

These reasons lead to the first hypothesis of this study:

Hypothesis 1: There is a positive relationship between levels of environmental commitment and environmental performance.

As one of the central concepts in this study is organisational environmental commitment, this section was dedicated to analysing and understanding the effects of environmental commitment on environmental performance. Environmental performance was articulated in this section as a way of measuring the real effects of improvements in the levels of environmental commitment on the natural environment, proposing that high levels of environmental commitment lead to increments in the environmental performance as the first hypothesis. Since the reduction of the impact on the natural environment is one of the most important objectives for organisations that are environmentally committed, it is important to determine and understand the important drivers able to affect the level of environmental commitment adopted by organisations, and this will be done in the next sections.

2.4 Predictors of environmental commitment

Given the importance of the role of environmental commitment in organisations as a way of decreasing negative impacts on the natural environment, it is important to understand elements that act as predictors of environmental commitment. The study of these predictors is important in order to comprehend the reasons why organisations adopt different levels of environmental commitment.

2.4.1 Management teams' motivations and organisational outcomes

Management literature has typically emphasized internal and external drivers as the most important reasons encouraging organisations to commit to the environment (Walker et al., 2008). Internal drivers that lead to improvements in environmental commitment come from within the organisation and consider issues such as the need for reducing costs through production efficiency (Green et al., 1996; Carter and Dresner, 2001), employee involvement in environmental initiatives (Hanna et al., 2000), investors' environmental requirements (Green et al., 1996; Trowbridge, 2001), owners/managers environmental values (Handfield et al., 1997; Wycherley, 1999; New et al., 2000) and perceptions towards the environment (Papagiannakis and Lioukas, 2012, Rivera-Camino, 2012). On the other hand, external drivers are generated outside the organisation, and contemplate issues such as environmental regulatory compliance (Henriques and Sadorsky, 1996; Walton et al., 1998; Hall, 2001; Zhu and Sarkis, 2006), increase in consumer preferences towards products made with environmentally-friendly practices (Klassen and Vachon, 2003; Sarkis, 2003; Zhu and Sarkis, 2006), or public pressure towards cleaner production (Sharma and Vradenburg, 1998; Wycherley, 1999; Delmas, 2001).

One of these drivers, the motivations and perceptions of top managers, has been identified as particularly important for explaining the differences found in the levels of environmental commitment in organisations (Weick, 1979; Jackson and Dutton, 1987; Thomas et al., 1993; Henriques and Sadorsky, 1999; Gonzalez-Benito and Gonzalez-Benito, 2006; Krueger et al., 2011). Although not much study has been dedicated to it, the relationship between individual-level motivations and organisational outcomes is highlighted (Ashford, 1993; Kemp, 1993; Cordano and Frieze, 2000; Flannery and May, 2000). Furthermore, the way top managers perceive their surroundings can affect the adoption of environmental commitment, an organisational attribute. Despite the importance of the effect of top managers' perceptions on organisational outcomes, and

specifically the relationship between their perceptions and the levels of environmental commitment adopted by organisations, studies such as Bansal and Roth (2000) and Bansal and Gao (2006) have highlighted that little attention has been given to this. Bansal and Gao (2006), for example, found that, of the 79 articles related to environmental issues they reviewed, only five addressed managers' characteristics with organisational outcomes, which suggests that this area is a source for future exploration. In addition, studies addressing individual motivations and organisational outcomes usually take a qualitative approach, aiming to be more informative rather than providing empirical evidence (Marshall et al., 2005; Sharma and Sharma, 2011). The present study looks to examine precisely the relationship between the perception of management teams and organisational outcomes (environmental commitment), providing at the same time empirical evidence about this relationship. In this regard, it should be noted that top managers are the individuals who have usually the greatest important influence within the organisation on strategic issues (Thomas et al., 1993; Sharma, 2000; Prakash, 2001; Bansal, 2003).

Perceptions and interpretations are described as the processes by which managers ascribe meaning to all the signals and information that they are able to process (Taylor and Fiske, 1978; Smart and Vertinsky, 1984; Thomas et al., 1993). These perceptions are the elements that will affect managers' criteria to make decisions on strategic issues. Management literature suggests that the decision making process is affected by managers' perceptions of strategic issues in positive or negative terms, and perceptions about the extent of controllability that managers feel they have over the strategic issue (Jackson and Dutton, 1988; Thomas and McDaniel, 1990; Thomas et al., 1993).

In addition, the environmental management literature highlights the importance of the external drivers of environmental commitment, which are primarily stakeholders' pressures. Stakeholders are considered to be one of the important drivers for environmental commitment (Henriques and Sadorsky, 1999; Buysse and Verbeke, 2003;

Gonzalez-Benito and Gonzalez-Benito, 2006; Garvare and Johansson, 2010; Sarkis et al., 2010). The importance of stakeholders arises from the point that organisations do not own the totality of resources needed and rely on the environment to obtain them. This situation results in the empowerment of these stakeholders (Aragon-Correa and Sharma, 2003; Rueda-Manzanares et al., 2008; Murillo-Luna et al., 2012). Considering that stakeholders such as the government, consumers or shareholders have been increasing their pressure on organisations to improve their environmental outcomes, the way managers perceive stakeholders' pressures is going to affect the level of environmental commitment adopted by the organisation.

2.4.2 Theory of planned behaviour

The three elements of perception previously described, perception of strategic issues in positive or negative terms, perceptions of controllability and perceptions of stakeholders' pressures, have been usually studied as isolated elements in the management literature (Thomas et al., 1993; Henriques and Sadorsky, 1999; Sharma, 2000; Buysse and Verbeke, 2003). Nevertheless, the behavioural literature proposes a relevant theoretical framework that can be used as a guide to include the three concepts under one study, the Theory of Planned Behaviour (TPB) (Ajzen, 1991).

The central ideas of TPB are as follows. The main orientation of TPB is to understand and predict individual human behaviour. According to Fishbein and Ajzen (2010), behaviours are the central elements of this theory and they are defined once four elements are set: "the action performed, the target at which the action is directed, the context in which is performed, and the time at which is performed" (Fishbein and Ajzen, 2010, p. 29). Any change in these elements results in the definition of another behaviour. TPB also states that the immediate antecedent of any behaviour is the individual's intentions of performing that specific behaviour (Ajzen, 1991; Fishbein and Ajzen, 2010). Intentions are

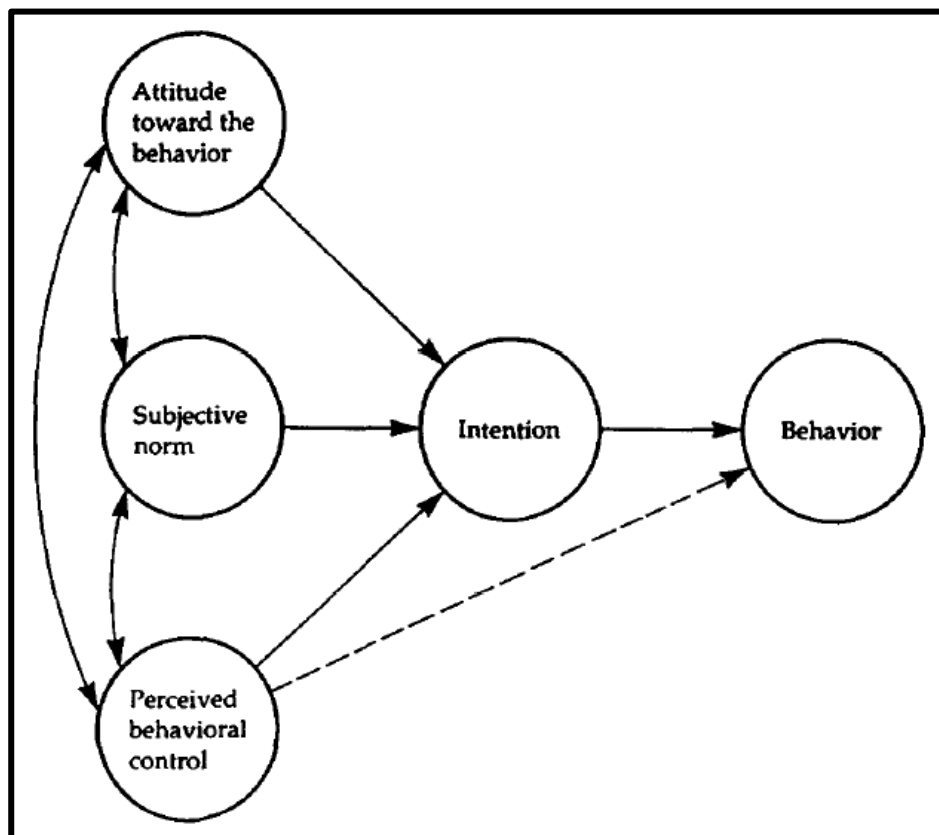
described as an individual's motivations, readiness, likelihood or willingness to perform certain behaviour (Ajzen, 1991; Fishbein and Ajzen, 2010). In turn, TPB states that antecedents to intentions to perform certain behaviour are three different factors that strongly depend on the individual's beliefs and perceptions: attitude towards the behaviour, perceived norms and perceptions of control (Fishbein and Ajzen, 2010) (Figure 1).

According to TPB, the group of the most salient beliefs held by an individual are the basic determinants for this individual to perform certain behaviour. In this sense, Ajzen (1991) claims that behavioural beliefs influence attitudes towards a behaviour, normative beliefs determine subjective norms and, finally, control beliefs affect perceptions of behavioural control. Direct and indirect methods can be used for measuring attitudes, subjective norms and perceptions of control. Direct methods involve asking directly to individuals their assessment of these factors in relation to a given behaviour. Indirect ways of measuring these factors encompass the need to first select a group of salient beliefs (behavioural beliefs, normative beliefs and control beliefs) and then ask individuals to assess these beliefs, in order to know, indirectly, their perceptions about the main constructs (attitudes, subjective norms and perceptions of control) (Gagne and Godin, 2000).

The TPB theoretical framework has been tested successfully in studies within and outside the organisational context (e.g., Boldero, 1995; Cordan and Frieze, 2000; Kaiser and Gutsche, 2003; Marshall et al., 2005; Bernath and Roschewitz, 2008; Rivera-Camino, 2012), and it has been used as a bridge between managers' perceptions and organisational environmental behaviour (Sharma and Sharma, 2011; Papagiannakis and Lioukas, 2012). The TPB framework proposes that particular behaviours, such as managers committing to the environment or lobbying their organisations to do so, can be explained by managers' attitudes towards the behaviour (perception of the behaviour in

negative or positive terms), perceptions of control over the behaviour and perceived norms (perceptions of pressure to undertake the behaviour).

Figure 1: Theory of planned behaviour (Source: Ajzen, 1991)



The first predictor is an individual's attitude towards certain behaviour. Attitudes can be described as "the degree to which a person has a favourable or unfavourable evaluation or appraisal of the behaviour in question" (Ajzen, 1991, p. 188) and they represent the individual's perceptions of the results or consequences of performing the behaviour (Ajzen, 1991; Fishbein and Ajzen, 2010). As an individual assesses the results of the behaviour before performing it, attitudes can also be considered as the result of a

process of evaluation. If the perceived outcomes are considered more positive than negative, the individual will show a positive attitude towards the behaviour. Conversely, if the perceived outcomes are more negative than positive, the attitude will probably be negative. Therefore positive attitudes will strengthen intention to perform the behaviour (Ajzen, 1991).

According to the TPB, a second predictor of intentions is perceived norms. Perceived norms are defined as “the perceived social pressure to perform or not to perform the behaviour” (Ajzen 1991, p. 188). Perceived norms are considered to be the perceived point of view about certain behaviour of the persons or groups which are important referents for the individual, influencing the individual’s intention to perform the behaviour. It is argued that perceived norms are a product of an individual’s normative beliefs, in the sense that these beliefs arise from the opinions and motivations of his/her important referents regarding the particular behaviour (Fishbein and Ajzen, 2010). Normative beliefs are basically the perceptions about significant others’ opinions about a behaviour (Eagly and Chaiken, 1993), and whether or not they would approve or disapprove of it.

The final predictor of intentions in the TPB is “perceived behavioural control”. Originally, the TPB is an extension of the theory of reasoned action, proposed by Fishbein and Ajzen (1975). The main difference between these two approaches is that the TPB includes the concept of perceived behavioural control among the factors affecting intentions. This expansion in the theory includes a component related to self-perceived capabilities required to perform the behaviour, such as time, money, knowledge and skills, which can be considered as barriers or limitations by the individual to performing the behaviour, despite having positive attitudes and social support towards it (Fishbein and Ajzen, 2010). In these kinds of situations, the theory of reasoned action is evidently insufficient to predict an individual’s intentions and behaviours. Perceived behavioural control is defined as “the perceived ease or difficulty of performing the behaviour” (Ajzen, 1991, p.

122). Perceived behavioural control represents the belief or perception about the extent of control exerted over determined situations which can facilitate or hinder the performance of the behaviour (Fishbein and Ajzen, 2010). This concept also can be understood in regard to the existence of resources, opportunities, skills and knowledge needed to perform the behaviour, and also dependent on the individual's assessment about the importance of these resources (Cordano and Frieze, 2000; Fishbein and Ajzen, 2010; Rivera-Camino, 2012). Research in this area has shown that an individual's intentions are directly affected by the perceptions of having the necessary skills and the confidence to engage with the behaviour (Papagiannakis and Lioukas, 2012). In addition, Ajzen (1991) claims that perceptions of control can also affect directly the performance of behaviours without going through intentions (Figure 1), since individuals confident enough about performing certain behaviour will be more likely to persist with it than individuals that feel less control, even if these individuals have same levels of attitudes and subjective norms.

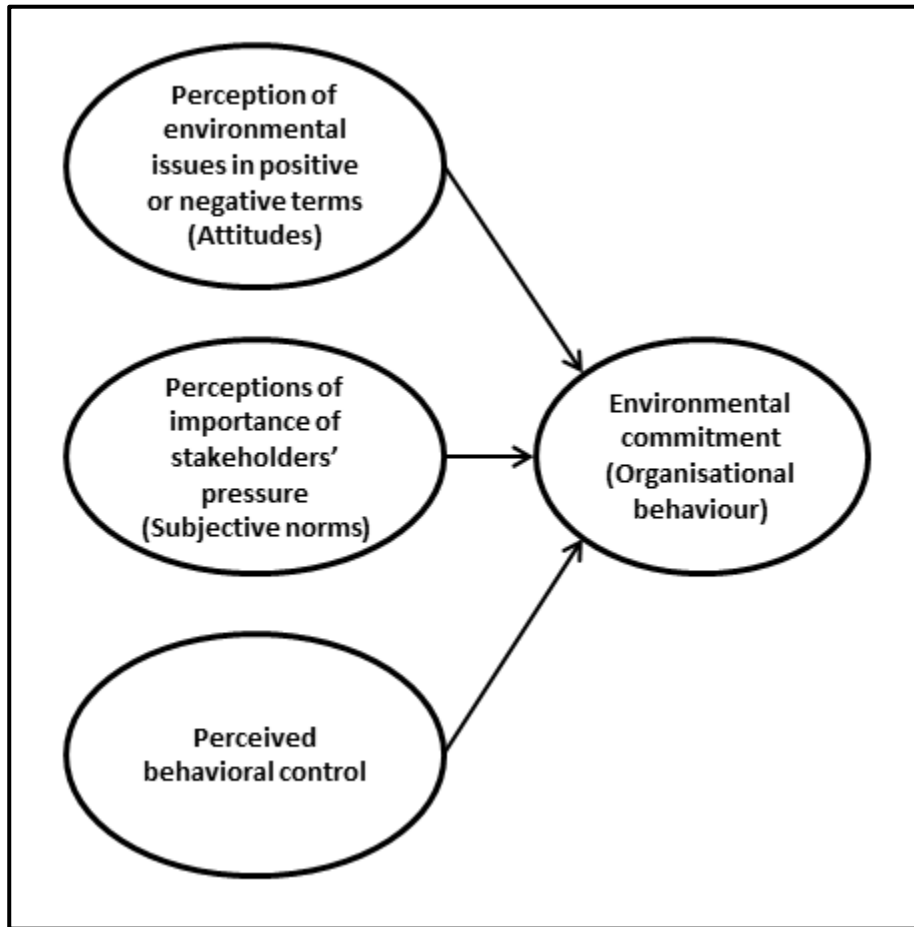
It is relevant for this study to know that there are authors who disagree with the role of intentions as antecedents of behaviour. Sheeran (2002), for example, after reviewing several empirical works based on the relationship between intentions and behaviours, concluded that this relationship is not as strong as proposed by Ajzen (1991). Intentions also seem to be a much more reliable antecedent for single behaviours, such as recycling raw materials, than for "goals" or sets of behaviours, such as environmental commitment (Sheeran, 2002). In addition, some authors question whether intentions by themselves can lead to behaviour, since there are other surrounding factors that can affect the performance of the behaviour, such as uncertain and unexpected events (Powers et al., 2005; Rivera-Camino, 2012). As a consequence, the TPB model also considers a direct connection between perceived control and behaviour, and when this model is used to describe "composite" behaviours such as environmental commitment, intentions tend to be omitted and the relationship is made directly between behaviour and its three

previous antecedents (attitudes, perceived norms and perceived behavioural control) (Sheeran, 2002).

In terms of this research, the importance of TPB is that it provides a framework for the way that the three elements of perceptions explained, attitudes, perceived norms and control can be used to predict composite behaviours such as environmental commitment. These elements coincide with those developed independently by studies in the environmental management literature (Jackson and Dutton, 1988; Thomas and McDaniel, 1990; Thomas et al., 1993; Henriques and Sadorsky, 1999; Buysse and Verbeke, 2003; Marshall et al., 2005): perception of environmental issues in positive or negative terms, perceptions of controllability and perceptions of stakeholders' pressures (Figure 2).

Environmental commitment, its drivers and the way they relate to each other are described in Figure 2. Although the element of "intentions", as previously explained, has been omitted in this research model, the rest of the elements proposed by TPB are presented as follows: the element of attitudes proposed by TPB is represented in this study as the attitudes that management teams have towards environmental commitment; perceived norms are considered as the perceived pressures exerted by the stakeholders of the organisation; perceived behavioural control is modelled as the perceptions that management teams have about the capabilities, skills and resources owned by or available to the organisation; and the behaviour to study is the extent to which organisations commit to the environment. The concept of intention to perform the behaviour is not considered in this study, since, as it was explained, environmental commitment is an organisational behaviour (composite).

Figure 2: Drivers of environmental commitment under the structure proposed by TPB¹



2.4.3 Relationship between environmental commitment and its antecedents

At this stage it is important to review research which has examined parts of the structure proposed by TPB and, in particular, the relationship between making an environmental commitment (behaviour) and the effects of its three predictors. Although TPB has been used to study all kinds of behaviour, when these behaviours are related to environmental care TPB has been used mostly to explain individuals' behaviours such as recycling and green consumerism (e.g., Sparks and Shepherd, 1992; Boldero, 1995). Nevertheless, the

¹ It is worth noting that the element of intentions is not present in this research model, as explained in p.32.

use of TPB to understand organisational environmental commitment has been growing slowly in recent years (Cordano and Frieze, 2000; Sharma and Sharma, 2011; Papagiannakis and Lioukas, 2012; Rivera-Camino, 2012).

Cordano and Frieze (2000), Rivera-Camino (2012) and Papagiannakis and Lioukas (2012) study the relationships between the three antecedents of behaviour proposed by TPB and environmental actions developed by organisations, finding important differences in the strength of these associations. Cordano and Frieze (2000), for example, found that the most important antecedent of environmental commitment were the attitudes shown by managers towards environmental improvements, whereas Papagiannakis and Lioukas (2012) and Rivera-Camino (2012) (studies based on Cordano and Frieze, 2000) found that the most important predictor was stakeholder pressure. The differences in the results found in these studies can be explained by the different contexts and characteristics of the industries and companies part of the sample examined. Cordano and Frieze (2000) use data obtained from the Environmental Protection Agency's Toxic Release Inventory (TRI) from the USA, focused more on very large companies such as Boeing, General Electric and Monsanto. Papagiannakis and Lioukas (2012) studied the environmental behaviour of medium and large local Greek companies that are considered to highly impact on the environment (belonging to the wood and paper, chemical, and metal industries). The companies analysed by Rivera-Camino (2012) were also of medium and large size, but from Northern Europe, meaning that the environmental regulations to which the companies of these studies are exposed are different.

An important common element present in the studies using TPB and environmental commitment drivers is the inclusion of additional variables considered to have an effect on these drivers. In this sense, Cordano and Frieze (2000) and Rivera-Camino (2012) state that the history of the organisation in environmental matters can affect managers' perception towards environmental commitment, arguing that positive previous experiences in these issues will positively affect managers' perceptions. Sharma and

Sharma (2011) consider that families that are part of the management team tend to influence positively the way the rest of the members of the management team perceive environmental issues. This is particularly important in the case of wineries, where a large number of these organisations are governed by families. Papagiannakis and Lioukas (2012) state that managers' personal values towards environmental issues can strongly affect their perceptions, and this is supported by empirical evidence. The present research also considers a variable able to affect the drivers of environmental commitment. This variable is the concept of information scanning, which will be explained in detail later.

The literature also provides examples of studies addressing the drivers of environmental commitment proposed by TPB as isolated elements. The relationship between the attitudes of the management team towards environmental issues and the level of environmental commitment adopted by the organisation has been addressed by considering these environmental issues as opportunities or threats for the organisation, arguing also that positive attitudes tend to lead to a broad range of solutions and alternatives to the environmental problem (Sharma, 2000; Marshall et al., 2005; Lopez-Gamero et al., 2011). The relationship between perceptions of control and environmental commitment is supported by the idea that less ambiguity and better understanding and knowledge about environmental issues can strengthen this link (Sharma, 2000; Marshall et al., 2005). The relationship between perceived norms and environmental commitment has been the most studied of the three elements in the environmental management literature. In these studies, generally the organisations that perceive regulatory stakeholders' pressures as the most important are considered to have low levels of environmental commitment, since these organisations are just looking for regulation compliance. Conversely, high levels of environmental commitment are linked to organisations oriented to their consumers, since these organisations expect to satisfy their demands in order to improve their sales (Henriques and Sadorsky, 1999; Buysse and Verbeke, 2003; Marshall, 2005; Murillo-Luna et al., 2008; Sarkis et al., 2010).

Although it is possible to say that literature studying the relationship between environmental commitment and the predictors proposed by TPB (attitudes, perceived norms and perceptions of control) tend to be scarce, at least in the cases considering the three predictors at the same time, some studies have noticed the need for exploring the TPB antecedents of behaviour to a deeper degree in different contexts and industries (Bansal and Gao, 2006). Of these studies, several examine these variables from a descriptive point of view, without providing quantitative evidence (Sharma and Sharma, 2011). In addition, authors tend to examine the concept of environmental commitment in different ways, and some studies have measured it using managers criteria (asking them directly) (e.g., Papagiannakis and Lioukas, 2012), whereas others works have used indexes such as TRI (e.g., Cordano and Frieze, 2003), which have been used traditionally to measure environmental performance, thus blending commitment and performance.

Another difference comes from the fact that studies considering environmental commitment and predictors in the wine industry are almost non-existent. The present study is based on the Australian wine industry, which allows understanding the effect of organisational size and environmental requirements (important elements in this industry) on the environmental commitment adopted. Finally, it is important to highlight that this study also includes the concept of information scanning effort performed by managers (which will be reviewed later in this chapter), a factor that is likely to affect the drivers of environmental commitment. Early works have also considered other elements that can influence these drivers, such as the companies' past environmental behaviour or managers' personal values (Cordano and Frieze, 2003; Sharma and Sharma, 2011; Papagiannakis and Lioukas, 2012; Rivera-Camino, 2012).

2.4.3.1 Attitudes of the management team towards environmental commitment

The TPB proposes that individual attitudes towards certain behaviours will contribute to whether or not that behaviour is performed by the individual (Jackson and Dutton, 1988; Thomas et al., 1993; Fishbein and Ajzen, 2010). This comes from the conceptual definition of attitudes, referring to the individual's outcome of evaluating "an object, concept, or behaviour along a dimension of favour or disfavour, good or bad, like or dislike" (Fishbein and Ajzen, 2010, p. 78). Although traditionally attitudes have been commonly associated with structures such as objects, institutions, human characteristics, events and others, this learning can also be applied to behaviours (Fishbein and Ajzen, 2010).

There is empirical evidence supporting positive relationships between managers' attitudes towards the environment and particular environmental behaviours, such as recycling, waste management and energy reduction (Barr, 2007; Vining and Ebreo, 1992). As proposed, these individual behaviours can be grouped to form part of the organisational environmental commitment, and therefore managers' attitudes can also be considered to affect the degree of environmental commitment as a whole.

Environmental management literature includes studies suggesting that managers with pro-environmental attitudes are positively associated with organisations with high levels of environmental commitment (Nutt, 1984; Thomas et al., 1993; Sharma, 2000; Gonzalez-Benito and Gonzalez-Benito, 2006; Sawang and Kivits, 2014). It is suggested that the attitude towards the environment is often determined by managers' personal appreciation, values and feelings, which in turn can be affected by elements such as knowledge and the level of information available for managers about the environmental issue or requirement (Thomas et al., 1993; Kaiser et al., 1999; Sharma, 2000).

As explained earlier, managers can categorise strategic issues, such as environmental commitment, in positive or negative terms (Jackson and Dutton, 1988; Thomas and

McDaniel, 1990; Thomas et al., 1993), since a positive judgement about environmental commitment will tend to cause organisations to engage with higher levels of environmental commitment. Gonzalez-Benito and Gonzalez-Benito (2006) argue that this positive relationship is facilitated in two ways. Firstly, managers with pro-environmental attitudes will be more cooperative in terms of resource availability and funding of environmental projects; secondly, managers with positive environmental attitudes will tend to encourage and support collaboration between different groups in the organisation in order to achieve environmental objectives and initiatives. Thus management's positive attitude towards the environment is more likely to mean clear support for most of the organisation's environmental initiatives (Hunt and Auster, 1990; Gonzalez-Benito and Gonzalez-Benito, 2006). It is important to note that these positive attitudes towards the environment usually come from managers' own motivations for being environmentally-conscious stewards, or from the certainty that benefits can be obtained, such as cost reductions, health improvements in employees, and surrounding communities, brand image improvement, or combinations of all of these reasons (Inman, 2002, Silverman et al., 2005).

Negative attitudes towards environmental commitment, on the other hand, may cause managers to increase their feelings of self-protection, opting for attitudes related to increments in efficiency in the organisation, represented as costs and budget reduction policies (Thomas et al., 1993; Sharma et al., 1999). These attitudes encourage the organisation to stay with the status quo or to adopt less desirable environmental practices in order to achieve other goals, limiting the organisational response range. Thus, the likelihood of adopting low levels of environmental commitment increases when managers interpret environmental issues as threats.

Another reason that could explain the relationship between managers' attitudes and environmental commitment is provided by Sharma (2000). This author argues that most solutions to environmental issues are dependent on new technologies and machinery, as

organisations often have to change or adopt cleaner and newer technologies to be able to react towards stakeholders' requirements. These technologies often add "complexity to production or delivery processes" (Russo and Fouts, 1997) and some managers might see them as threats to themselves and the organisation, since these new technologies involve an important learning stage. Managers who perceive these new environmental technologies as threats may be more likely to adopt a very basic commitment to the environment, embracing low-level solutions likely to be reconsidered in a short time period when environmental requirements become more demanding. Conversely, managers with a more positive attitude towards new clean technologies will appreciate the prospective benefits of them in relation to the acquisition of competitive advantages. This positive attitude may lead them to increase the commitment between the organisation and the environment, adopting a proactive behaviour towards the environment and more elaborated solutions that can go much further than regulatory compliance (Sharma, 2000; Sroufe et al., 2002).

The previous discussion suggests that managers' positive attitudes towards environmental issues will be positively associated with the levels of environmental commitment adopted by the organisation. Managers' positive attitudes influence their intentions of fostering environmental collaboration between the different members of the organisation and their predisposition to engage in environmental policies, practices and strategies in order to improve the organisational environmental behaviour (Thomas et al., 1993; Sharma et al., 1999; Gonzalez-Benito and Gonzalez-Benito, 2006). The second hypothesis of this thesis is proposed:

Hypothesis 2: There is a positive relationship between managers' attitudes towards environmental commitment and the level of environmental commitment adopted by the organisation.

2.4.3.2 Stakeholders as drivers of environmental commitment

Perceived norms, the second predictor considered in the structure proposed by TPB, are based on the perceptions about significant others' approval or disapproval of certain behaviour, affecting positive or negatively the likelihood of performing that behaviour (Fishbein and Ajzen, 2010). As explained previously, perceived norms, in the case of organisations, can be equated with stakeholders (Cordano and Frieze, 2000; Rivera-Camino, 2012; Papagiannakis and Lioukas, 2012), who are considered to be an important driver of environmental commitment by the environmental management literature (Henriques and Sadorsky, 1999; Buysse and Verbeke, 2003; Gonzalez-Benito and Gonzalez-Benito, 2006; Garvare and Johansson, 2010; Sarkis et al., 2010; Sarkis et al., 2011). Stakeholders are variously defined, but one of the more recurrent definitions in the environmental management literature is the concept by Freeman (1984), where stakeholders are defined as "any group or individual who can affect or is affected by the achievement of the organisation's objectives" (Freeman, 1984, p. 46). Foley adds to this definition, stating that stakeholders are certain agents "capable of causing the enterprise to fail, or could cause unacceptable levels of damage, if their needs are not met" (Foley, 2005, p.138).

The TPB suggests a positive relationship between perceived norms and an individual's behaviours, which can be adapted to the context between stakeholders and environmental commitment. Based on the foundations of social power described by French and Raven (1959), it is possible to explain the ways that stakeholders influence organisations to perform an improvement in environmental commitment, with reward and coercive power identified as most important. Reward power is related to the attribute of stakeholders to recompense organisations for improving environmental commitment. As an example, consumers can reward organisations that stand out in environmental concern, preferring their products and encouraging people around them to buy these products too. The second element, coercive power, is understood as the

punishment exerted by stakeholders on organisations when they do not perform the desired level of environmental commitment. In this situation, organisations may not be able to continue without the support of their stakeholders (Clarkson, 1995; Murillo-Luna et al., 2008). Examples of this are the penalties imposed by regulators or pressures exerted by industrial organisations.

In terms of this research, reward and coercive powers assist in the determination of the group of stakeholders that are considered to be capable of having an important effect on environmental commitment, namely, consumers, government, environmental groups, citizens/communities, public media, wine and grapes associations, competitors, suppliers and employees, which are also based on the studies of Henriques and Sadorsky (1999), Buysse and Verbeke (2003) and Murillo et al. (2008).

Within the stakeholders' group, consumers have a particular relevance. Garvare and Johansson (2010, p. 740), for example, consider them the foremost stakeholders since "they provide the revenue necessary to satisfy the other stakeholders". Consumers' preferences play an important role in the environmental commitment of organisations, since consumers worldwide are starting to prefer products made via environmentally-friendly practices. Buysse and Verbeke (2003) call this behaviour "green consumerism", meaning that consumers will reward organisations that perform environmental responsibility, even paying an extra fee for the products and services produced under these conditions (Cervi, 2008). Conversely, consumers can punish those organisations with a low environmental commitment or bad reputation, discontinuing their support and ceasing to buy their products. In a worst case scenario, they can join other stakeholders, such as the media, in raising publicly their complaints (Henriques and Sadorsky, 1999). In the case of employees, there is evidence suggesting that qualified employees will tend to avoid organisations with environmental deficiencies (Buzzelli, 1991; Reinhardt, 1999; Buysse and Verbeke, 2003). Therefore the lack of a qualified workforce will cause those organisations with low environmental commitment to lose

competitiveness (Porter, 1985). Governments are another important stakeholder who can change the legal framework using the practices of the highly committed organisations as a standard for the industry, gaining these organisations an important advantage against their competition (Sharma, 2000; Sarkis et al., 2010). In the case of organisations with low environmental commitment, governments and authorities can force them to comply with regulations, threatening them with heavy fines or closure, and affecting their reputation and survival. Industrial associations are instances of self-regulation that can also have an effect on the organisational environmental commitment, compelling organisations to follow certain codes of conduct (Fassin, 2008). Low levels of environmental commitment can affect organisations' reputation, which can make suppliers stop providing their resources and raw materials in order to protect themselves (Henriques and Sadorsky, 1999; Buysse and Verbeke, 2003). Regarding competitors, organisations with higher levels of environmental commitment can form strategic alliances with their competitors to address important environmental problems (e.g., the alliance among USA car manufacturers to reduce air pollution) (Henriques and Sadorsky, 1999). On the contrary, organisations with low environmental concern are likely to be surpassed by their competition, since consumers with stronger environmental preferences are going to prefer the products or services provided by companies with a "greener" posture (Buysse and Verbeke, 2003). Finally, citizens, communities, public media and environmental groups can exert considerable pressure on companies that have environmental harmful practices, being particularly important the actions of communities located in the vicinity of the organisation.

All these reasons suggest that the reward and coercive powers exerted by stakeholders are capable of compelling organisations to improve their environmental commitment, since organisations need the support of their stakeholders to stay competitive. The reasons explained above support the development of the following hypothesis:

Hypothesis 3: There is a positive relationship between the perceived level of pressure from stakeholders for environmental commitment and the actual level of environmental commitment adopted by organisations.

2.4.3.3 Managers' perceptions of control and environmental commitment

Unlike the theory of reasoned action, TPB recognises that attitudes and perceived norms are not enough to describe the performance of a determined behaviour. The individual's perception of control over the behaviour is also a factor that needs to be understood and studied (Fishbein and Ajzen, 2010). Perceived behavioural control is defined as "the extent to which people believe that they are capable of performing a given behaviour, that they have control over its performance" (Fishbein and Ajzen, 2010, p. 154). According to TPB, perceived behavioural control is affected by opportunities, skills and levels of information that individuals have about the behaviour. Some studies state that it is possible to predict individuals' behaviour more precisely by the perceptions about their own capabilities and skills, rather than by what they are really capable of performing (Bandura, 1997). This might explain the different extents of performance of certain behaviours experienced by individuals with the same levels of capabilities and skills.

According to the behavioural literature, the relationship between an individual's perceptions of control and the behaviour performed is positive (Fishbein and Ajzen, 2010), which is aligned with the organisational literature (Cordano and Frieze, 2003; Papagiannakis and Lioukas, 2012; Rivera-Camino, 2012; Sawang and Kivits, 2014). The main reasons explaining a positive relationship between managers' perceptions of control and environmental commitment is that the fact of having certain skills, resources and mastery is going to be crucial for managers to be able to adopt higher levels of environmental commitment successfully (Thomas et al., 1993; Bandura, 1997). If managers think or perceive they do not have the resources or the skills necessary to

commit the organisation environmentally, their perceptions of control will diminish, even if attitudes and perceived norms support the performance of the behaviour (Bandura, 1977; Fishbein and Ajzen, 2010; Papagiannakis and Lioukas, 2012). High perceptions of control can influence greatly the performance of certain behaviour, because individuals as managers are going to put significant effort into actions in which they feel they can succeed (Bandura, 1986; Papagiannakis and Lioukas, 2012). Managers are more likely to aim higher in their environmental projects and assume more risks as their confidence has been boosted, increasing their capability to identify opportunities in environmental commitment (Krueger Jr. and Dickson, 1994). Thus managers who perceive they have a high level of control over environmental actions are likely to view environmental commitment as something they have control over (Papagiannakis and Lioukas, 2012).

These arguments lead to the third hypothesis of this thesis:

Hypothesis 4: There is a positive relationship between managers' perceptions of control towards environmental commitment and the level of environmental commitment adopted by the organisation.

2.5 Information scanning effort and effects on manager's perceptions

The previous sections explained the concept of environmental commitment as an organisational behaviour, and also explained the role that elements such as managers' attitudes, perceived norms (stakeholders' pressures) and managers' perceptions of control have as drivers that lead managers to increase this organisational environmental commitment. Nevertheless, Fishbein and Ajzen (2010) agree there are important antecedents capable of affecting predictors in this theoretical framework. This section will discuss the role of one of these antecedents: the concept of knowledge and information scanning, and the way these elements can affect the predictors of

behaviours. It will also review the idea that information can help managers to make sense of (manage, interpret and understand) the environmental situations faced (what they are, what to do and how they can affect the organisation) (Thomas et al., 1993; Gioia and Thomas, 1996; Sharma, 2000). The level of information collected and analysed by managers will determine the perception of the environmental issue as a competitive opportunity or as a threat, involving a gain or a loss for the organisation (Thomas et al., 1993; Anderson and Nichols, 2007).

2.5.1 Information scanning

Considering that the predictors of behaviour are based on an individual's perceptions, some studies have suggested that information about the natural environment and the way managers scan for it can affect managers' perceptions about environmental issues (Kaiser and Shimoda, 1999; Maheran et al., 2009). The relationships between information and predictors of behaviour (specifically the predictors of environmental commitment in the present research) can help to increase the understanding of the reasons why organisations adopt different levels of environmental commitment, in cases where organisations are quite similar in size and profits, and are in the same industry (Maheran et al., 2009; Franco et al., 2011; May et al., 2010).

Before interpreting environmental issues and adopting a level of commitment, managers must consider the importance of the role of the information in decision-making processes. Dill (1962), for example, describes the organisational surroundings not as set of problems, opportunities or agents, such as stakeholders requesting changes, but as the information available for managers about these elements. The performance of information scanning is the first step towards the interpretation of strategic issues (Weick, 1979; Daft and Weick, 1984; Thomas and McDaniel, 1990; Thomas et al., 1993) and affects the identification of difficulties and opportunities, the understanding of these

events and the shape of the responses adopted by managers (Hambrick, 1982; Daft and Weick, 1984; Kuuvas, 2002).

Thomas et al. (1993, p. 241) define scanning as “searching the external (and internal) environment to identify important events or issues that might affect an organisation”. Jain (1984) also considers that the information scanning effort made by managers includes the search and collection of information from the surroundings, but suggests that it also includes the way of analysing this information, in terms of understanding it, storing it and incorporating it into the organisational knowledge. Jain (1984) further proposes that managers must perform information scanning under a selective process, as surroundings are complex and sophisticated and usually involve broad ranges of data and information that sometimes managers are not able to identify or process. In this sense, information scanning should be a well-focused process, with clear goals and objectives.

Different managers tend to perform information scanning in different ways, highlighting some issues over others, emphasising certain sources of information and also differing in the amount of information scanned or in the frequency of scanning. These differences increase the gap between managers’ interpretations, perceptions and responses (Thomas et al., 1993; Sharma, 2000; Aragon-Correa and Sharma, 2003; Gonzalez-Benito and Gonzalez-Benito, 2005; Murillo-Luna et al., 2012). In addition, the importance of information scanning increases when managers and organisations must face events or situations that are ambiguous, equivocal, confusing and surprising, and, for the same reason, difficult and complex to understand (Weick, 1979; Maitlis, 2005), such as environmental issues (Henriques and Sadorsky, 1999). Managers must interpret these events to find a suitable answer before market conditions change, consumers change their interests or competition takes advantage of it (Daft and Weick, 1984).

To understand the differences in the process of information scanning developed by different managers, it is necessary first to measure this process. The most common ways of conceptualising and measuring the performance of information scanning in literature

have been through the information scanning frequency and methodology performed by managers. Information scanning frequency is understood as how often managers scan their surroundings during certain units of time (Hambrick, 1982; Qiu, 2008; Maheran et al., 2009). This has been usually determined by asking managers questions related to the time they spend performing scanning, or how many times per week they search for information.

It is important to recognise that information collection as an isolated process is not enough to shape an understanding of the strategic issue and a response towards it, as the analysis of this information is also required. In this sense, information scanning methods consider the way managers process the information collected. Issues such as information analysis, information understanding, storing and sharing are also evaluated (Jain, 1984; Franco et al., 2011). The reason for this is explained in Jain (1984), who states that information can affect managers' interpretation of strategic issues as long as managers are able to understand this information and to incorporate it into their strategies.

After the process of information scanning has been measured, it is necessary to classify it according to the results obtained. Information scanning has been described to be in a continuum ranging from primitives, where managers and organisations do not scan actively, receiving information usually without intention, to advanced, where managers reveal a clear intention at the time of scanning, compromising important resources in this activity such as time and money (Jain, 1984; El Sawy, 1985). The ways of measuring information scanning frequency and methodology will be reviewed extensively in the next chapter of this thesis, Research Methodologies.

At this stage, and considering that the process of information scanning is different for different organisations, it is important to describe some of the factors able to affect the performance of this process that have been identified by the management literature. Organisational size, for example, is one of these variables. It has been found that usually

managers of small and medium organisations tend to make fewer efforts to perform information scanning, developing just a basic methodology in comparison to managers in large organisations, (Beal, 2000). This can result from the fact that small and medium size companies have fewer resources to invest in knowledge and information. Nevertheless, it has also been found that small and medium companies are also less bureaucratic and more flexible than their larger counterparts in changing or adopting new practices oriented to improving scanning behaviour (Maheran et al., 2009; Franco et al., 2011). Other variables studied in the management literature able to affect information scanning are the kind of industry to which the organisation belongs, the level of entrepreneurship embraced by managers, and even external factors such as historical and political contexts (Hambrick, 1982; Qiu, 2008; May et al., 2010). All these elements can explain, to an extent, differences in the performance of information scanning found in different organisations.

Overall, management literature states that it is possible to find important differences between the information scanning practices performed by different managers in organisations (Maheran et al., 2010; Franco et al., 2011). Characteristics such as organisational size, personal attributes and motivations can become factors able to affect the level of effort made in performing information scanning (Hambrick, 1982; Beal, 2000; Qiu, 2008). Most importantly, studies have documented empirical evidence showing that the performance of different levels of information scanning does affect managerial decision-making processes (Maheran et al., 2009). In addition, the effect of information scanning can vary, depending on the kind of decisions and the strategic field to which they belong (Maheran et al., 2009). Since most studies researching information scanning have compared different industries and different areas of interest, such as the economy, competition and sales, it is interesting to analyse what the effects of information scanning are in a limited context. The present study analysed the effects of information scanning in one area of interest, organisational environmental behaviour, in a single industry, the Australian wine industry.

2.5.2 Relationship between information scanning effort and the predictors of environmental commitment

As explained, the process of information scanning entails information collection and the analysis of this information. The results of this process are capable of affecting managers' perceptions about strategic issues (Thomas and McDaniel, 1990; Maheran et al., 2009). This section will examine the way information scanning can affect the predictors of behaviour described in the previous sections. In this sense, how the acquisition and assimilation of information can affect managers' attitudes, perceived norms and perceptions of control towards the behaviour of adopting an environmental commitment will be reviewed.

2.5.2.1 Relationship between information scanning effort and managers' attitudes towards a strategic issue

Information can shape an individual's perceptions about an issue (Thomas et al., 1993; Sharma, 2009). As part of the process of information scanning, managers must collect and analyse information. Once this process is finished, the result of the analyses of this new information can affect managers' judgements towards a certain topic, which could be labelled as an opportunity or a threat, as gain or loss, or in positive and negative terms (Thomas and McDaniel, 1990; Thomas et al., 1993; Sharma, 2000, Murillo-Luna et al., 2012). These labels attached by managers are likely to influence the complete response of the organisation towards these issues (Thomas and McDaniel, 1990; Anderson and Nichols, 2007). Situations considered as positive generally will be related to a potential gain for the organisation and likely to be under control. Managers label situations in positive terms when their organisations are likely to obtain competitive advantages, such as product and process differentiation, cost savings, greater efficiency or improved brand image (Gonzalez-Benito and Gonzalez-Benito, 2005; Murillo-Luna et al., 2012). Conversely, issues labelled as negative by managers are considered as threats to the survival of the organisation, as a potential loss and out of managerial control. In this

sense, managers who interpret, for example, new and cleaner technologies as unpredictable and risky are more likely to adopt low levels of environmental commitment (Sharma, 2000).

The amount of relevant information about environmental issues collected and the way managers analyse this information are parts of a variable that could play an important role in shaping managers' attitudes towards the environment. Thomas and McDaniel (1990, p. 289) describe the amount of available information analysed as "the quantity of data about a situation that an organisation's participants gather and use for interpretation". It is argued that the amount of information analysed can affect an individual's attitudes since it improves the level of understanding of the strategic issue: as much information is collected and analysed, the understanding of the strategic issue will tend to improve, shaping in this way how managers label the strategic issue and the way organisations respond (Thomas et al., 1993).

A considerable number of studies (which are discussed below) that address the relationship between information and attitudes consider that large amounts of information about an issue tend to lead individuals (managers) to have more positive attitudes towards the issue, helping to keep an open search for solutions (Thomas et al., 1993). It has been stated that large amounts of information can provide managers with more raw material and evidence for their interpretation, seeing opportunities where others see threats (Hambrick, 1982; Daft and Weick, 1984; Thomas et al., 1993; Sharma, 2000; Kuvaas, 2002). In addition, there is also empirical evidence which suggests that organisations with more access to information perform better and are more open to embrace innovation in their solutions (O'Reilly, 1980; D'Aveni and MacMillan, 1990; Lybaert, 1998). Specifically, in the cases of attitudes towards environmental commitment, Sharma (2009) states that information related to issues such as regulations, practices, standards and technologies can improve managers' environmental attitudes and increase the levels of organisational environmental commitment through the knowledge obtained,

getting access to solutions and directions that are effective and also satisfactory from the stakeholders' point of view. The argument that more information leads to positive attitudes is reinforced, since other studies have proposed that large amounts of information are needed to shape managers' perceptions about relatively new and ambiguous strategic issues such as environmental commitment (Thomas and McDaniel, 1990; Thomas et al., 1993; Sharma, 2009).

The present study will work with the hypothesis that high levels of information scanning can lead managers to perceive environmental issues as positives, since information can decrease significantly uncertainty and ambiguity, leading managers to see complex environmental issues positively as opportunities (Thomas and McDaniel, 1990; Thomas et al., 1993; Sharma, 2000; Sharma, 2009). These studies also provide empirical evidence about this relationship. After reviewing these arguments, the hypothesis is:

Hypothesis 5: There is a positive relationship between the level of information scanning effort made by managers and their attitudes towards environmental commitment.

2.5.2.2 Relationship between information scanning effort and perceived norms (stakeholders)

According to Fishbein and Ajzen (2010), the way individuals perceive significant others' opinions about a behaviour can affect the performance of this behaviour. This means that managers' perceptions about a particular behaviour can be affected by the opinion of social entities such as key stakeholders. As has been shown, stakeholders are important referents for managers, and their requirements must be fulfilled by the organisation in order to survive (Freeman, 1984).

In order to increase the amount of information collected and scanned, managers must increase the level of interaction that they have with their surroundings to be able to access more diverse information. As stakeholders are one of the important sources of information for organisations (Daft and Weick, 1983; Daft and Weick, 1984; Choo, 2001), managers should open and create communication channels with stakeholders, allocate resources to make sense of stakeholders' requirements and encourage employees to increase their contact with stakeholders (Daft and Weick, 1984; Beal, 2000; Choo, 2001). The creation of these communication channels will mean that stakeholders are able to inform managers about their requirements and interests, thus increasing managers' awareness about stakeholders' importance (Choo, 2001). Examples of communication between managers and stakeholders include awareness about new regulations (involving regulatory stakeholders) and about the changing preferences of consumers (Inman, 2002).

The relationship between information scanning and managers' perceptions of the importance of stakeholders' pressures can be better exemplified when considering particular stakeholders. In the case of consumers, for example, environmental demands have increased recently, and an increasing percentage of consumers are willing to pay more for products manufactured under environmentally-friendly policies, preferring them against the competition (Grankvist et al., 2004). For the specific case of the Australian wine industry, Barber et al. (2009) and Mueller and Remaud (2010) found that consumers have become less price-sensitive and more willing to prefer wines produced under processes that impact less on the environment. Information scanning in this case increases managers' awareness about consumers' preferences, leading them to align the products offered to match consumers' requests (Barber et al., 2009). In the case of stakeholders such as governments, as explained earlier in this chapter, they are also capable of affecting organisations, using regulations and coercive power. Information scanning acquires a tremendous importance for managers at the time of identifying new environmental regulations and the best way to face them (Henriques and Sadorsky,

1999). Information scanning performed by managers focused on the relationship between stakeholders and the natural environment may increase managers' awareness about stakeholders' power to affect the organisation positively or negatively, increasing managers' perception of the importance of stakeholder's pressures. This concept is based on the idea that, in order to survive, organisations cannot remain isolated from their surroundings, and information and its analysis are the way that organisations remain competitive (Choo, 2001).

The need for more information is likely to lead managers to improve communication channels with stakeholders. More information about stakeholders and environmental issues will mean managers will be more aware about their stakeholders' requirements, making easier the satisfaction of these requirements. Since managers tend to perceive "only one dimension of stakeholders' demand for environmental protection, rather than different demands coming from different stakeholder groups" (Murillo-Luna et al., 2008, p. 1229), increasing managers' awareness of the general environmental requirements will mean an increment in the importance of all the stakeholders of the organisation, because their requirements will also be met.

The previous discussion leads to the following hypothesis:

Hypothesis 6: There is a positive relationship between the level of information scanning effort made by managers and their perception of importance of stakeholders' pressures.

2.5.2.3 Information scanning effort and perceptions of control

When the strategic issues faced by managers are equivocal and ambiguous, it is harder to feel a sense of control over them. As a way of disambiguation, information scanning can boost managers' sense of control, leading perceptions towards optimism (Thomas et al., 1993; Lesca et al., 2012). Several authors state that managers with more access to high

volumes of information are better suited to work with uncertain and ambiguous issues because such managers can increase their knowledge and understanding about these issues (Milliken, 1990; Weick and Sutcliffe, 2001; Kuvaas, 2002; Anderson and Nichols, 2007). Individuals' feelings of stress and anxiety caused by working with ambiguous issues can be relieved by counting on more information about these issues, in order to reach a judgment (Eisenhardt, 1989; Zacharakis and Sheperd, 2001). Based on an analysis of the book *Organizations in Action* (Thompson, 1967), Thomas et al. (1993) propose that managers who use high levels of information will have a better understanding of the origin of the equivocal strategic issue and also about its consequences. According to them, "a sense of mastery and a feeling that no stone has been left unturned emerges" (Thomas et al., 1993, p. 243), leading managers to interpret and perceive strategic issues as more controllable. It is important to state that, for boosting control, information must be properly analysed and interpreted (Kuvaas, 2002; Haase and Franco, 2011).

Hough and White (2003) and Sund (2013) argue that information scanning performed by individuals is a natural process related to the learning and improvement of knowledge about unknown issues or situations. Hough and White explain that the collection of information and its analysis have the objective of decreasing perceived risks and increasing the confidence to act under uncertainty, because individuals (managers) are more suited to understand cause-and-effect relationships. Eisenhardt (1989) and Hough and White (2003) have provided empirical evidence supporting the relationship between the increasing usage of information and managers' perceptions of control of ambiguous issues, stating that this is produced by an increase in the self-perception of competence to act about these issues.

In general, the arguments for considering a positive relationship between large amounts of information analysed and managers' perceptions of control are quite similar to the arguments used to validate a positive relationship between information and managers' attitudes. Thomas and McDaniel (1990) and Thomas et al. (1993) state that any

organisational mechanism set in place to increase the use of information will improve the likelihood of managers interpreting strategic issues in positive terms and as controllable. In addition, larger amounts of information can lead organisations to increase the range of answers, responses and actions. Sharma (2009) argues that the core objectives for organisations are growth, competitive advantages and long-term survival. Organisations are aware about successful environmental experiences and this fact encourages them to benchmark their performance with the organisations that are leaders in their industry in environmental protection. Nevertheless, the author states that sometimes environmental objectives are not in line with organisational objectives, and the benefits are not always clear. As environmental issues tend to be complex, Sharma argues that information and knowledge are the keys to managers' understanding the way environmental commitment can be aligned with organisational objectives. Once organisational objectives are aligned with environmental commitment, it gets easier to show a positive attitude towards environmental issues, along with sensing an increment in the perceptions of control.

The next hypothesis can be deduced from the previous discussion:

Hypothesis 7: There is a positive relationship between the level of information scanning effort made by managers and their perceptions of control over environmental commitment.

2.6 Summary

Environmental management literature states that increased concerns about the natural environment are imposing more demanding requirements on organisations. Governments, consumers and other stakeholders require organisations to improve their environmental practices, and these kinds of strategic issues must be addressed quickly by managers in order to prepare themselves and their organisations for these changes.

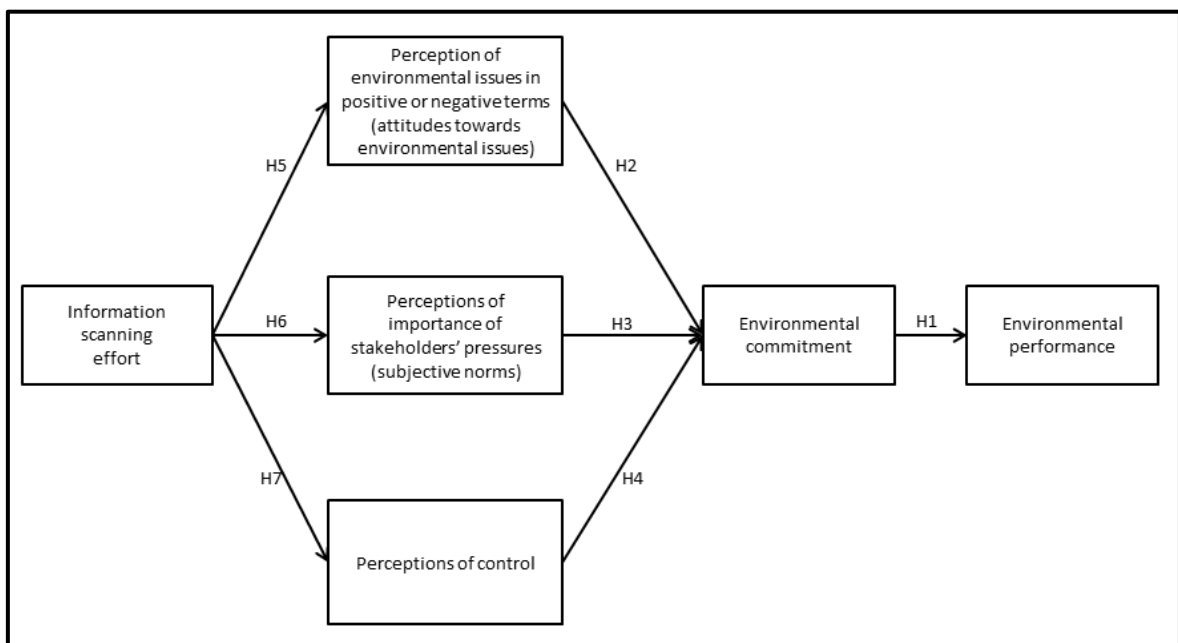
Organisations must adopt responses ranging from low levels of environmental commitment, involving initiatives just focused on accomplishing the minimal requirements to survive (regulation compliance), to high levels of commitment, where the organisation is willing to do more than required, either because of personal motivations or because of the interest of obtaining advantage from these changes. In cases of adopting high levels of environmental commitment, organisations must be able to identify the environmental requirements, and hopefully predict them before they become mandatory, in order to attract benefits and competitive advantages (Sharma, 2000; Gonzalez-Benito and Gonzalez-Benito, 2006).

The first relationship to study in this research is the link between environmental commitment and environmental performance. Environmental performance, understood as the results or outcomes of environmental commitment, is usually measured by a set of environmental parameters. The value of this relationship is based on the importance for managers in ensuring and understanding that their environmental efforts (engagement in environmental practices and policies) are reflected in improvements in environmental performance. Since environmental commitment is aimed at improving organisational environmental performance, it is important to identify the cases in which this relationship might be positive or negative. This relationship is considered in the Hypothesis 1 in the research model in Figure 3.

One important objective of this research is to study the factors that motivate managers and organisations to improve their environmental commitment. The research model used in this investigation (shown in Figure 3), and specifically the elements that model the predictors of environmental commitment, are based on the literature review and guided by the theory of planned behaviour. The TPB model describes the relationships between certain behaviour and its four main antecedents. These antecedents, as presented in the literature review, are managers' attitudes towards certain behaviour, perceived norms about that specific behaviour and the perceived control that managers feel they have

over the behaviour, which affect the final and closest antecedent of behaviour, the intentions of performing the behaviour (Fishbein and Ajzen, 2010). As explained in the literature review, the role of intentions is not considered in this research, since there is strong evidence indicating that the importance of intentions tends to decrease when the considered behaviour consists of a group of behaviours (such as environmental commitment, which consists of several individual environmental behaviours), rather than specific behaviours (Sheeran, 2002). Therefore, in this research, the link will be made directly between attitudes, perceived norms, perceptions of control and behaviour, which is also the same approach adopted by similar studies (e.g., Papagiannakis and Lioukas, 2012; Rivera-Camino, 2012). The behaviour of interest for this research is the level of environmental commitment adopted by the organisation, which can affect greatly the environmental performance that the organisation is able to develop. The hypotheses built to address these relationships are numbers 2, 3 and 4 (Figure 3).

Figure 3: Conceptual framework and principal variables



An important characteristic about environmental requirements is that they change and evolve rapidly, motivated by new policies, public opinion, and are even pushed by needs in the same organisations. This causes difficulties for managers in being prepared and in making the right decisions on time. Issues such as uncertainty play a very important role in the decision-making process (Daft et al., 1988; May et al., 2000; Choo, 2002). Uncertainty arises when managers are unable to understand or foresee the rapidly evolving strategic issues, which in many instances is worsened by a lack of information about the same issue. Information and the way managers scan and understand this information are considered important elements at the time of facing complex situations (Thomas et al., 1993). May et al. (2000), for example, recognise that uncertainty usually leads managers to increase and improve the processes of information scanning.

This reasoning is the base for considering information as an important variable in this research. As described in the literature review, TPB recognises that knowledge and amounts of information are elements powerful enough to affect behaviours through managers' perceptions (Fishbein and Ajzen, 2010), and in particular the level of effort made by managers to scan for information about strategic issues plays an important role at the time of making decisions such as environmental commitment (Weick, 1979; Daft and Weick, 1984; Thomas and McDaniel, 1990; Thomas et al., 1993). This topic has not been studied in depth by behavioural literature, and studies providing empirical evidence about this relationship are scarce. Therefore this study will research the effect of information scanning efforts performed by managers on their perceptions about a certain behaviour (adoption of an environmental commitment). This is addressed by Hypotheses 5, 6 and 7.

A summary of the Hypotheses prepared for this work is as follows:

Hypothesis 1: There is a positive relationship between the level of adoption of environmental issues and the environmental performance obtained by the organisation.

Hypothesis 2: There is a positive relationship between managers' attitudes towards environmental commitment and the level of environmental commitment adopted by the organisation.

Hypothesis 3: There is a positive relationship between the perceived level of pressure from stakeholders for environmental commitment and the actual level of environmental commitment adopted by organisations.

Hypothesis 4: There is a positive relationship between managers' perceptions of control towards environmental commitment and the level of environmental commitment adopted by the organisation.

Hypothesis 5: There is a positive relationship between the level of information scanning effort made by managers and their attitudes towards environmental commitment.

Hypothesis 6: There is a positive relationship between the level of information scanning effort made by managers and their perception of importance of stakeholders' pressures.

Hypothesis 7: There is a positive relationship between the level of information scanning effort made by managers and their perceptions of control over environmental commitment.

Table 1 shows the most relevant references in literature for the constructs and relationships studied in this research.

Table 1: Constructs and relationships in this study with their most relevant references

		Most relevant references
Constructs	Information Scanning	Jain (1984); El Sawy (1985); Daft et al. (1988); Qiu (2007); Maheran et al. (2009); Franco et al (2011); Lesca et al. (2012); Sund (2013)
	Attitudes	Jackson and Dutton (1988); Vining and Ebreo (1992); Thomas and McDaniel (1990); Thomas et al. (1993); Barr (2007); Amason and Money (2008); Fishbein and Ajzen (2010); Sawang and Kivits (2014).
	Subjective Norms	Freeman (1984); Cervi (2008); Murillo-Luna (2008); Garvare and Johansson (2010); Werder (2011)
	Perceptions of Control	Jackson and Dutton (1988); Eisenhardt (1989); Amason and Money (2008); Papagiannakis and Lioukas (2012); Rivera-Camino (2012).
	Environmental Commitment	Mitzberg (1989); Henriques and Sadorsky (1999); Sharma (2000); Hoffman (2001); Buysse and Verbeke (2003); Howard-Greenville et al. (2007); Murillo-Luna et al. (2008); Gabzdylova et al. (2009); Sarkis et al. (2010)
	Environmental Performance	Klassen and Whybark (1999); Annandale et al. (2004); Henri and Journeault (2008); Lopez-Gamero et al. (2009); Simpson and Samson (2010)
Relationships to test in this study (Hypotheses)	Environmental Commitment - Environmental Performance (H1)	Young (1991); Schmidheiny (1992); Sarkis and Cordeiro (2001); Link and Naveh (2006); Aragon-Correa and Rubio-Lopez (2007); Frondel et al. (2007)
	Attitudes - Environmental Commitment (H2)	Jackson and Dutton (1988); Thomas et al. (1993); Barr (2007); Vining and Ebreo (1992); Nutt (1984); Sharma (2000); Gonzalez-Benito and Gonzalez-Benito (2006); Kaiser et al. (1999); Hunt and Auster (1990); Inman (2002); Silverman et al. (2005); Sharma et al. (1999); Sroufe et al. (2002)
	Subjective Norms - Environmental Commitment (H3)	Cordano and Frieze (2000); Rivera-Camino (2012); Papagiannakis and Lioukas (2012); Henriques and Sadorsky (1999); Buysse and Verbeke (2003); Gonzalez-Benito and Gonzalez-Benito (2006); Garvare and Johansson (2010); Sarkis et al. (2010); Sarkis et al. (2011)
	Perceptions of Control - Environmental Commitment (H4)	Bandura (1997); Cordano and Frieze (2003); Papagiannakis and Lioukas (2012); Rivera-Camino (2012); Krueger Jr. and Dickson (1994)
	Information Scanning - Attitudes (H5)	Thomas and McDaniel (1990); Maheran et al. (2009); Thomas et al. (1993); Sharma (2009); Sharma (2000); Murillo-Luna et al. (2012); Anderson and Nichols (2007); Hambrick (1982); Daft and Weick (1984); Thomas et al. (1993); Sharma (2000); Kuvaas (2002)
	Information Scanning - Subjective Norms (H6)	Daft and Weick (1983); Daft and Weick (1984); Choo (2001); Grankvist et al. (2004); Barber et al. (2009); Mueller and Remaud (2010)
	Information Scanning - Perceptions of Control (H7)	Milliken (1990); Weick and Sutcliffe (2001); Kuvaas (2002); Anderson and Nichols (2007); Eisenhardt (1989); Zacharakis and Sheperd (2001); Hough and White (2003)

The next chapter, Research Methods, will explain how to operationalize all the variables identified in the present chapter, how to measure them, how data were collected and the quantitative techniques used in order to analyse the data obtained.

Chapter 3

3. Research Methodology

3.1 Introduction

The purpose of the present study is to understand the reasons why organisations adopt different levels of environmental commitment. As explained in the literature review, organisations (specifically managers) build their environmental strategy based on their perceptions, attitudes, feelings and amounts of information collected. These factors are capable of influencing behaviours such as the adoption of certain levels of environmental commitment, understood as the performance of different practices and actions oriented to satisfy their stakeholders' pressures (Mintzberg, 1989; Henriques and Sadosky, 1999; Sharma, 2000; Sarkis et al., 2010). In order to examine these relationships, this study used the theory of planned behaviour (TPB) as a theoretical lens (Fishbein and Ajzen, 2010). This research considers the managers' adoption of an environmental commitment as the behaviour under study.

The objective of the present chapter is to describe all the practices used to collect and analyse the relevant data for this research, in order to examine the hypotheses developed during the literature review. The research model built to address these hypotheses will be presented in the next section, including the description and the development of the variables involved and the theoretical bases used in their determination. Next, the procedures to obtain and collect the data from the Australian wineries are explained, presenting the survey used and the way it was constructed. Finally, this chapter provides descriptions of the statistical procedures used to analyse the data obtained from the survey: confirmatory factor analysis, structural equation modelling, and related techniques to assure construct validity and reliability.

3.2 Definition and Measurement of Variables

This section explains the variables depicted by the research model and the way they were measured. These variables are:

- Information scanning effort
- Managerial attitudes towards environmental commitment
- Stakeholders' pressures about environmental commitment
- Managerial perceptions of control towards environmental commitment
- Organisational environmental commitment
- Environmental performance.

These scales were measured through a five-points Likert scale. The main reason for choosing five points is that most of the scales are adapted from studies that have used this structure (e.g. Buysse and Verbeke, 2003; Amason and Money, 2008; Simpson and Samson, 2010), and it makes easier to compare results with these studies.

3.2.1 Information Scanning Effort

Information scanning effort consists of the practices performed by managers related to the collection and analysis of information about trends, events and changes (Jain, 1984; Qiu, 2007; Franco et al., 2011) and it supports the planning for the future movements of the organisation (Aguilar, 1967; Franco et al., 2011). In order to measure the way managers obtain and analyse information from their surroundings, the present study adopted the information scanning effort scale proposed by Jain (1984), El Sawy (1985)

and Maheran et al. (2009). These studies are widely recognised in the information literature and have been used as a theoretical base for important research in this area (Choo, 1993; Franco et al., 2011).

Jain (1984), El Sawy (1985) and Maheran et al. (2009) suggest that information scanning effort should be measured considering the methodology followed by managers at the time of scanning, which takes into consideration issues such as focus of scanning, existence of a deliberate effort to scan, regular-basis scanning and the treatment of the information once scanned. Using this scale, it is possible to categorise organisations on a continuum, ranging from low scanning efforts, where managers are “exposed to information, without purpose and effort” (Jain, 1984, p. 118), to advanced scanning efforts, where managers make a structured and deliberate effort to look for information, and the collection of information is based on a pre-established methodology and focused on specific topics (Jain, 1984).

In order to evaluate the way managers scan information from their surroundings, the scale used has eight items. The first item of the scale asked if managers make a deliberate effort at the time of scanning information. According to Jain (1984) and El Sawy (1985), at the very low levels of the continuum of information scanning effort, managers tend to receive information by “chance”, without any intention, and usually this information lacks of strategic value. As the level of scanning effort increases, it is more likely that managers look for information more actively and with an intention and purpose, improving their chances of finding useful information. The second item is the frequency of information scanning performed by managers, which, according to literature (Hambrick, 1981; Daft et al., 1988; Maheran et al., 2009), leads to improvements in environmental practices and performance. The third item measures the existence of a pre-established scanning methodology, which is a good indicator of the level of effort that the management team is dedicating to the information scanning process. This item shows whether managers are randomly scanning for information or following structured scanning patterns. The fourth

item assesses whether or not managers scan for information having a focus on crucial areas of environmental care. The fifth item measures the extent to which managers truly analyse the information collected, which is also part of the level of effort of information scanning. The sixth item measures the level of understanding that usually managers have about the information scanned. The seventh item measures the extent to which information is stored for future references. Finally, the last item aimed to detect the extent to which managers incorporate the information scanned into the organisational environmental strategy. These eight items were measured using a five-point Likert scale from “strongly disagree” to “strongly agree”.

3.2.2 Managerial Attitudes towards Environmental Commitment

Attitudes are one of the elements proposed by TPB as a predictor of behaviour (Fishbein and Ajzen; 2010). Once managers have scanned and analysed environmental information, they should be able to take a stand, adopting a position or attitude towards their organisations’ environmental commitment, labelling it in positive or negative terms (Thomas et al., 1993).

The scale for measuring managers’ attitudes towards environmental commitment was based on the model proposed by Jackson and Dutton (1988) and further developed by Thomas et al. (1993). Originally, Jackson and Dutton measured an individual’s attitudes in terms of the extent to which the individual perceived strategic issues in positive terms and potential gains, but Thomas and McDaniel (1990) simplified the measure, considering positive attitudes and perceptions of potential gains as elements that are “operationally indistinguishable” (Thomas et al., 1993, p.241) and parts of a single dimension. This scale has been used in further studies with high reliability coefficients (e.g., Amason and Mooney, 2008).

The survey developed examined the attitudes held by the management team, assessing four statements which determined the kind of perception (positive or negative) that management teams expressed towards environmental commitment. The scale used had five points, ranging from “strongly disagree” to “strongly agree”. The four statements are as follows:

- The management team labels actions that preserve the environment as having positive implications for the firm.
- The management team perceives actions that preserve the environment as a potential gain.
- The management team believes benefits will be derived from actions that preserve the environment.
- The management team feels the future of the firm will improve as a consequence of actions that preserve the environment.

3.2.3 Stakeholders’ pressures about environmental commitment

One of the predictors of behaviour proposed by TPB, perceived norms, can be equated to the stakeholders of the organisation (Rivera-Camino, 2012; Papagiannakis and Lioukas, 2012), and the present work follows the same path. Stakeholders are different groups that are inter-related with the organisation in some way (Freeman, 1984). Usually stakeholders have requirements, negatively affecting the organisation if their requirements or demands are not met (Freeman, 1984; Murillo-Luna et al., 2008; Werder, 2011; Garvare and Johansson, 2010).

Managers' perceptions of perceived norms are usually measured in the environmental management literature through managers' perceptions of stakeholder pressure to adopt environmental commitment. In the present study, perceived norms were measured taking into consideration the group of stakeholders capable of affecting directly the environmental commitment of the organisation through the coercive and reward powers described in Chapter 2. These stakeholders are based on the studies of Henriques and Sadosky (1999), Buysse and Verbeke (2003) and Murillo et al. (2008) and are used often in the environmental management literature, namely, consumers, government, environmental groups, citizens/communities, public media, wine and grapes associations, competitors, suppliers and employees.

The question measuring perceived norms in the survey required managers to answer what was the perceived importance of each of the stakeholders proposed when considering adopting an environmental commitment. These items were measured using a five-point Likert scale from "strongly disagree" to "strongly agree".

3.2.4 Managerial Perceptions of Control towards Environmental Commitment

In order to measure managers' perceptions of control over environmental issues, the scale used was based on studies by Jackson and Dutton (1988), Thomas et al. (1993) and Amason and Mooney (2008), and uses a five-point Likert scale ranging from "strongly disagree" to "strongly agree".

The first item of the scale measured the extent to which management teams perceived that their organisations counted on the capabilities, resources and skills required to undertake an environmental commitment. Levels of skills and mastery exhibited by managers in relation to environmental issues have been persistently discussed in the

literature as an important issue able to affect perceptions of control (Thomas et al., 1993; Sharma, 2000; Amason and Mooney, 2008). The item is:

- The management team feels it has the capability and technical knowledge to implement actions that preserve the environment.

The second item asked about the perceived level of control that management teams have over the adoption of a certain level of environmental commitment: do management teams feel free to decide about the level of environmental commitment to adopt in their organisation, or, on the contrary, do management teams feel obligated to adopt a commitment because there is no other choice that allows them to stay competitive? The rationale of this item, according to Thomas et al. (1993), is that management teams that feel that they have the choice or option of adopting a commitment to the environment will also feel a higher level of control over environmental issues (practices, policies, regulations), since this decision is going to be made based on their perceptions of the skills and resources controlled by the organisation, and, in general, to their own pace of work. Conversely, managers who feel obligated to adopt a certain level of environmental commitment are likely to feel a reduced perception of control over environmental issues, as the new level of commitment is imposed by third parties through, for example, environmental regulations (Thomas et al., 1993; Amason and Mooney, 2008). This level of commitment imposed by external agents (environmental stakeholders) might be beyond the skills and resources of the organisation, introducing a feeling of uncertainty and ambiguity for managers. In addition, the requirements imposed might be expected to be met within short periods of time, adding pressure, stress and anxiety to managers (Eisenhardt, 1989).

The item is:

- The management team has a choice about whether or not to implement actions that preserve the environment.

3.2.5 Organisational Environmental Commitment

The present research measures environmental commitment based on the study by Gonzalez-Benito and Gonzalez-Benito (2005), which classifies the most common environmental practices found in the environmental management literature in four categories. The reason for using this classification is based on the large range of different environmental practices that organisations are able to adopt, which cannot always be reduced to a single dimension. Environmental management literature provides a comprehensive list of environmental practices for measuring environmental commitment, and it has been argued that they are part of different dimensions of the same concept. Some of these practices are aimed to be implemented at the corporate and planning levels (Gonzalez-Benito and Gonzalez-Benito, 2005), whereas other practices are more related to operations and production (Sarkis, 2001), or to communicate and report environmental progresses to stakeholders (Sarkis et al., 2011).

This study adopts the measure by Gonzalez-Benito and Gonzalez-Benito (2005), which classifies the most common environmental practices into four main categories, based on their degree of similarity: planning and organisational practices, operational practices related to products, operational practices related to processes, and communicational practices. The planning and organisational practices category measures the extent to which organisations have identified environmental objectives and determined and adopted environmental practices for reaching those objectives. This category encompasses elements such as the identification of levels of environmental compliance, the definition of organisational environmental objectives and values, the existence of a budget and investments for environmental development, and the internal assignment in

the organisation of environmental responsibilities between employees along with their training. The next category, operational practices related to products, measures the development of more environmentally-friendly products. The elements in this category are related to practices such as the replacement of environmentally-harmful inputs. In regard to process-related practices, they are mostly policies aimed at reducing harmful effects on the environment with measures such as pollution reduction, waste treatment, recycling and the acquisition of clean technology. Finally, communicational practices include all the practices used by organisations to communicate the environmental status of the organisation and keep their stakeholders informed about the advancements made in environmental issues. This is expected to show that the organisation is aware of environmental improvements required and that measures have been taken to meet these requirements, showing results that support this environmental commitment. The communicational practices usually considered relate to, for example, environmental certifications, environmental reports, environmental awards and the sponsorship of environmental event.

The environmental practices selected for this work were evaluated according to a five-point Likert scale (“strongly disagree” to “strongly agree”) and grouped according to the classification proposed previously by Gonzalez-Benito and Gonzalez-Benito (2005) (Table 2).

Table 2: Classification of Environmental Commitment based on Gonzalez-Benito and Gonzalez-Benito (2005)

	Environmental commitment practices
Planning and Organisational	The environmental objectives are perfectly defined at your winery.
	The budget for environmental investment represents an important percentage of the total investment budget of your winery.
	The employees at your winery receive training on environmental issues.
	Environmental protection is one of the basic values of your winery's policies.
	It is clearly established who on the staff at your winery assumes the environmental responsibilities.
Operational practices: Processes	Your winery uses some environmental impact correction measures such as purifiers, waste treatment, and/or recycling, soil restoration, air filters, water treatment.
	At your winery, technologies are used that minimize water consumption
	At your winery, technologies are used that minimize the pollution produced and that prevent a subsequent purification and/or waste treatment process.
Operational practices: products	Your winery attempts to substitute the raw materials/products used that pollute the most with others that pollute less.
	Your winery attempts to substitute fertilizers that pollute the most with others that pollute less.
	Your winery attempts to substitute the most harmful pesticides with less damaging alternatives.
Communication	Your winery periodically prepares an environmental report for the shareholders or owners.
	The environmental measures adopted by your winery are certified.
	Your winery reports its environmental behaviour to its consumers
	Your winery requires its suppliers to be environmentally certified.

3.2.6 Environmental Performance

Measuring environmental performance can become a difficult undertaking, since there is no consensus in the literature (Lober, 1996). Ways of measuring environmental performance have included employee involvement, environmental auditing, measurement of environmental emissions, relationships with stakeholders, waste

management and organisational engagement with certification programs such as ISO14001 (Lober, 1996; Link and Naveh, 2006; Simpson and Samson, 2010). Recent studies addressing this topic have focused on issues such as emissions, waste reduction and substitution (Simpson and Samson, 2010).

This study measures environmental performance through direct consultation. Managers were asked about their environmental performance in their organisations, self-evaluating the effectiveness of the practices adopted. The advantage of this method is that it can include as many environmental aspects as required, asking also about issues such as inputs, energy and waste reduction (Simpson and Samson, 2010). As the present study is grounded in managers' perceptions, and all the questions in the survey aimed for responses according to these perceptions, it was decided to apply this method, asking managers directly about their environmental results.

The scale used in the present study is based on the work of Simpson and Samson (2010). Managers were requested to give their personal opinion about their companies' achievements relative to the industry average in nine different items, as described in Table 3. The scale measures the organisational environmental performance in the areas of waste and recycling, pollution reduction (solid and liquid, and air emissions), energy and water consumption reduction, and hazardous material substitution. The five-point Likert scale ranged from "much below than industry average" to "much above than industry average".

Table 3: Items of the scale measuring environmental performance

Items for measuring environmental performance
Internal recycling of waste material
Consumption of waste internally
Reduction of total tonnage of solid wastes
Reduction of total volume of liquid wastes
Air emissions reductions
Energy saving, through internal policies and/or energy-efficient equipment
Water consumption reduction
Substitution of hazardous materials for non-hazardous materials in processes
Substitution of environmentally-harmful pesticides for less harmful alternatives

3.2.7 Control variables

The present research focused on the Australian wine industry. Despite the existence of some large companies, this industry traditionally has been composed mostly of small and medium organisations, and this characteristic might have the power to affect the results found in this study. Therefore the size of organisations must be considered as a control variable in the research model. Organisational size as a control variable has been adopted by several studies in the environmental management literature (Aragon-Correa, 1998; Sharma, 2000; Rivera-Camino, 2012), and specifically in studies researching environmental commitment and behaviour (Papagiannakis and Lioukas, 2012; Rivera-Camino, 2012), since it is argued that medium and large organisations usually have more resources available to invest in environmental commitment (staff and equipment) than smaller organisations, making an important difference in the environmental practices adopted. In addition, large organisations have more media exposure, becoming targets of social pressure. These reasons tend to lead large organisations to adopt a superior environmental commitment in order to keep their stakeholders satisfied (Sharma, 2000;

Buyse and Verbeke, 2003). Conversely, small organisations sometimes lack resources, interest or encouragement to commit to the environment.

The present study will consider two different control variables as proxies of organisational size: tonnes of grapes crushed by the winery and number of employees in the winery. Although most studies tend to consider organisational size in relation to annual sales, tonnes of grapes crushed seemed to be a better proxy, since the natural environment is affected by the amount of goods produced, and sales might not be reflecting this issue in the wine industry. The price of a bottle of wine can vary widely, depending on factors such as quality, year of production, brand, and so on. In this way, a “boutique” winery (usually a very small organisation) might sell a very small production (with a low effect on the environment) at expensive prices, obtaining returns that might be compared to the sales of bigger wineries that are producing much more (affecting much more the environment with their operational processes) at lower prices. The number of employees in the organisation is also normally used as a control variable and it tends to reflect the amount of resources managed by the organisation.

3.3 Sample and procedures

3.3.1 Unit of analysis

The unit of analysis of a research study is usually described as the focus of the study (Zikmund, 2000; Wong, 2002). Since the object of this study is to research the way management teams can affect their organisation (winery) with their perceptions, the main unit of analysis used in this study is the organisation.

3.3.2 Cross-Sectional Study

This study was based on cross-sectional data. Cross-sectional design allows studying the relationships of interest at a predetermined moment in time, as a picture of the object of the study at a certain instant. A study based on a cross-sectional design has the advantage of allowing the collection of data from a considerable number of individuals at the same time and within a short period. In addition, most studies in environmental management literature have tended to be built based on a cross-sectional design, gathering all the data needed at just one single time through methodologies such as surveys (e.g., Sharma, 2000; Murillo-Luna et al., 2008; Lopez-Gamero et al., 2008).

3.3.3 Selection of the sample for this study

The total population of wineries in Australia in the year 2011 was 2,477 (Winebiz, 2012) and most are small to medium in size. Around half are grape growers and do not have wine-making facilities, crushing their grape production somewhere else. Based on the comments by industrial associations and some wineries' managers, many of the very small grape growers have their businesses as a hobby, not producing on a yearly basis. According to Sharma (2000), very small businesses tend to have neither the resources nor the motivation to go beyond very basic levels of environmental commitment.

In order to assure that wineries' managers have at least a certain level of interest in environmental commitment, this study considers wineries which make wine onsite, since they tend to be larger in size and have a more formal organisation, along with better defined budgets, practices and policies. The overall number of Australian wineries making wine onsite in 2011 was 1,294 (Winebiz, 2012), representing the population of relevance for this study.

3.3.4 Data collection methods

This study used a questionnaire survey as the primary method of data collection, complemented by follow-up calls to increase the response rate. The use of questionnaires that can be responded autonomously by managers is especially relevant for this study, given that wineries in Australia are widely spread across the country. Additionally, surveys have been used frequently as ways of collecting data in studies related to environmental commitment, behaviour and information scanning (e.g., Thomas et al., 1993; Henriques and Sadosky, 1999; Sharma, 2000; Murillo-Luna et al., 2008; Papagiannakis and Lioukas, 2012). Surveys are one of the most suitable tools to identify and measure issues such as managers' perceptions (Sharma, 2000). In addition, surveys can provide anonymity and confidentiality to respondents, increasing the chances of obtaining honest answers and diminishing the likelihood of social desirability bias (Choo, 1993; Wong, 2002).

3.3.5 Pilot Survey

Dillman et al. (2008) state that it is necessary to test a questionnaire before sending it as a way of observing and foreseeing possible problems and difficulties that can affect the number of responses and their quality. To test the questionnaire involves finding individuals from the sample willing to spend some time responding to the questions and providing feedback about issues such as wording of questions and level of comprehensibility. It is also important to note whether or not individuals understand and interpret each question in a similar way, and if the avenue for responses is clear for them (Choo, 1993; Dillman et al., 2008). Furthermore, a pilot survey is very useful as a way of testing the content validity of the questions, since it is checked by individuals with a high level of understanding in the field of research (in this instance, wine managers, academics, wine associations and environmental institutions).

The questionnaire, based on the literature review, was tested on eight small- to medium-size wineries located in the Yarra Valley, Victoria, Australia. The individuals contacted by the researchers to develop the survey were the managers of these wineries. In order to identify interest and suitable managers for the pilot stage, an introductory letter with information about the project was sent to the 64 wineries associated with the Yarra Valley Wine Growers Association during 2011, located in the Yarra Valley region, in the Australian state of Victoria. This introductory letter requested an interview with managers for them to respond to the survey and subsequently provide their opinion and feedback about difficulties (if any) associated with the process of answering. The Yarra Valley region was selected for its relative importance in Australian wine production (it accounts for 16% of Victorian wine production, and 1% nationally), and also for being located near where the research was carried out (Melbourne, Victoria). Sixty-four letters were sent; eight wineries expressed interest in being part of this stage, agreeing to meet with the researchers. The visits were undertaken during early 2012, and they consisted of a brief introduction of the project and its objectives, the presentation of the questionnaire and a request to respond to the questions. In responses, managers were asked to provide comments regarding duration to complete the survey, difficulty to read or respond and any other suggestion they had. Managers took an average of around 12 minutes to complete the survey, and most of suggestions were focused on the rewording of some questions to make them clear, and additionally, managers also contributed to define and shape the stakeholders that were perceived by them as important in the industry.

In addition to these eight wineries, input from other institutions related to the industry and with interest in environmental care was sought. These institutions include the Victorian Department of Sustainability and Environment (DSE)², whose mission statement declares it to be a government-dependent institution in charge of the protection and

² Now Department of Environment and Primary Industries (DEPI).

sustainable management of water, land and natural resources (DSE, 2012), the Winemakers' Federation of Australia (WFA) and Wine Grape Growers Australia (WGGA). The reason these institutions were approached was because of their important understanding of the core activities of wineries' managers, the pressures to which they are exposed and their needs. It is necessary to highlight that the institutions (i.e., in addition to winery managers) chosen for responding to this pilot study were organisations with a high degree of experience in the environmental area, and regularly encouraged environmental improvements in wineries and other industries. Most of the comments made by these institutions suggested rewording some questions in order to make them clearer, and there were also important suggestions about splitting some questions and items into two so as to obtain more information from managers. This was specifically observed in the questions associated with the acquisition of new and cleaner technologies when measuring environmental commitment.

3.3.6 Survey Administration

The survey designed for this study was intended for wineries' managers. The study of managerial issues tends to be a difficult topic to examine, since managers are usually characterised by their lack of time, which plays against data collection procedures. This fact is usually reflected in a low response rate reported in research examining these kinds of issues. In order to overcome this problem and increase the response rate, Dillman et al. (2008) proposed methods to address this, which are outlined below.

The on-line survey brings savings in time and money. For respondents, it means that the questionnaire does not need to be sent on the mail, representing savings on time. For researchers, the on-line survey brings savings in costs (stationery and postage are not required), and savings in time, since responses are transferred immediately to the analysis programs.

The design of the survey instrument was oriented to make the task of answering easier. The survey was made available on the web through Qualtrics®, software that provides a platform with templates to build easy-to-read and easy-to-respond questions through web technologies and graphic interfaces. This also provides an improvement for the researcher, since the answers were saved with structures easily recognised by data analysis programs, such as SPSS®, facilitating data importation.

This study was introduced through an explanatory statement (Appendix 1), which included the foundations of this project and the high value accorded every response for obtaining reliable results. It was also explained that the object of this research was to improve the knowledge of the variables affecting the environmental commitment in their own industry (wine industry). An abstract with the most important findings of the project was offered once the study was finished. In order to increase respondent trust in the project, the survey included the name of Monash University at the top of the questionnaire and in the introductory letter, endorsing the project.

The contact information of the wineries of the sample was acquired from The Wine Industry Directory, which additionally has statistical reports of the Australian wine industry. In total, this directory contains contact information for 2,477 wineries in Australia, including the winery's name, address, phone number, organisational e-mail account and names of managers and their respective role in the winery, along with data associated with their level of production, export destinations, brands and corporate website. In the database, approximately half the wineries also provided the direct e-mail of their managers. For the other half, phone calls were needed in order to obtain managers' e-mail addresses, and to explain the motivation of the research and the importance of answering the survey, along with promising confidentiality for respondents. The survey was sent on March 2012, along with an introductory letter and a direct link to the survey's webpage. After the surveys were dispatched, three follow-up messages in the form of e-mails encouraged managers to respond. These follow-ups were

made two, four and six weeks after the first request for participation. The steps used to contact wineries' managers and the subsequent follow-ups were based on Dillman et al.'s (2008) suggestions.

In addition, and in order to gain research approval, the introductory letter and the survey instrument were submitted to The Monash University Human Research Ethics Committee (MUHREC), in order to check that all requirements were met. As the survey was on-line, anonymity was protected completely, since no register or information about any respondent was linked to the data received.

3.3.7 The structure of the questionnaire

Most of the suggestions and comments from winery managers and institutions were included in the final questionnaire. The existing items used to measure the constructs were modified to incorporate these new ideas, adapting the contents according to the literature and the reality of this particular study. The final survey had six sections organised as follows:

1. Section 1: Background information. Winery managers were requested to provide information about their location (Australian State), the size of their production, the years of operation, the number of employees, the range of sales, profit, the volume of international sales and the position of the respondent in the winery. This information was needed to establish the firmographic characteristics of the respondents.
2. Section 2: Stakeholders. Winery managers were asked about the level of importance perceived about certain stakeholders: stakeholders are consumers, shareholders/owners, environmental groups, citizens and communities and public media.

3. Section 3: Environmental commitment. Managers were asked about the level of environmental commitment adopted by their wineries, through several propositions involving recycling practices, investments in environmental measures, substitution of pollutant inputs, technological acquisitions, environmental policies, and environmental reporting.

4. Section 4: Information scanning. Managers were asked about the methods followed to scan information related to environmental issues. Topics in this section include level of analysis of the new information found, level of understanding, likelihood for the information to become part of the environmental strategy and scanning frequency.

5. Section 5: Managers' perceptions about environmental issues. This section aimed to understand managers' perceptions of control over environmental issues and their feelings about these issues, in positive or negative terms.

6. Section 6: Performance. Managers were asked about the environmental performance of their wineries. Important issues were reduction in wastes, air and water emissions, energy and inputs reductions, water consumption and recycling levels.

3.3.8 Non-response bias

Non-response bias is associated with the differences that might exist between the individuals who answer the survey and those who do not (Dillman et al., 2008), which can affect greatly the reliability of the results obtained, because an important part of the population might not be represented in the study. Armstrong and Overton (1977) suggest that, in order to estimate the effect of non-response bias, some of the results obtained from surveys must be compared against known values for population. Therefore, two aspects of the sample were compared against the population in this research: the size of

the organisations responding the survey, in terms of tonnes of grapes crushed, and the geographic location of the respondents. This analysis is performed in section 4.2, specifically in tables 4 and 5. Known values for the population for these items were collected from the Australian Wine Industry Directory.

3.3.9 Social desirability bias

According to Dillman et al. (2008), social desirability bias is the respondents' tendency to provide answers that might be viewed as correct by the rest of society, even if in reality they are doing things in completely different ways. For the present study, this behaviour might be produced by managers' concern about revealing or exposing their practices to the public. In order to reduce this tendency, the introductory letter submitted along with the survey declared explicitly the aim of the study, highlighting the fact that there were no good or bad responses. Additionally, complete confidentiality was assured to encourage honest responses.

3.4 Statistical analysis

The data collected through the survey were analysed using several statistical techniques, starting with a standard screening (outliers, missing data, homoscedasticity, linearity) to refine and prepare the information obtained, through to a deeper statistical analysis using SPSS version 19. The analysis performed was confirmatory factor analysis and structural equation modelling (SEM), using AMOS version 19. These and other analysis techniques used are described in the following sections.

3.4.1 Data screening

Data screening is an important procedure that should be performed before undertaking data analysis. Data screening consists of assessing certain characteristics of the data collected, such as missing values, outliers and properties such as homoscedasticity and linearity, which are basic requirements for techniques such as SEM, the statistical technique used in this study. According to Hair et al. (2009), data screening is needed in order to gain knowledge and understanding about the relationships between the variables of interest. This understanding can help to refine the research model and to improve the quality and accuracy of the predictions and conclusions presented. In addition, as explained, data screening is required to ensure that the data collected are suitable for being analysed by the proper multivariate analysis, satisfying the assumptions of the statistical methods and techniques.

Hair et al. (2009) state that usually researchers might consider it unnecessary to proceed with data screening, since it takes time and normally no corrections have to be made. Instead, Hair et al. propose to consider data screening techniques an 'investment' or 'insurance', since these techniques ensure that the results obtained are not skewed or biased.

Missing data

Missing data tend to be an important problem in studies that base their conclusions on data collected through surveys (De Vaus, 2002), and it refers to the unavailability of information or valid values in one or more variables (Hair et al., 2009). If no corrective measure is taken, missing values can affect the sample size of the data collected, since the cases with missing information might be removed from the analysis. If this is the case, the study could finish with an amount of information that will be insufficient for performing the analysis reliably. In addition, if the missing data have been allocated in a

non-random way, the results and conclusions of the analysis could be biased, since certain groups of respondents might be excluded from the analysis (Hair et al., 2009).

According to De Vaus (2002) and Hair et al. (2009), there are three different ways of dealing with missing data. The first is replacing the missing data using estimated scores (such as the average). The second is deleting the rows of data containing missing data. The third, a special case of replacement, consists in estimating the missing data using statistical distributions. Additionally, there is one variation of the second option that is widely used, which consists on a special kind of deletion called pairwise. Pairwise deletion consists in deleting the row of data just in the cases where the missing part is used in the calculations. The rest of the data of that specific row are used normally when the missing data are not involved in the relationships analysed (Pallant, 2010).

In order to decide if pairwise deletion can be used, the researcher first must perform an assessment of the missing data, identifying possible patterns in the structure of missing values, aiming to affect the least possible the original distribution of the variables with the corrective measures adopted (Hair et al., 2009). The assessment of missing data can be performed by tabulating '(1) the percentage of variables with missing data for each case, and (2) the number of cases with missing data for each variable' (Hair et al., 2009, p. 55). This method allows identifying high concentrations of missing data in the observations. Tabachnick and Fidell (2012) propose to exclude cases pairwise when missing data are less than 5% for a determined case or observation.

Outliers

In statistical analysis, an outlier is an element of the data which is numerically inconsistent with rest of the data (Barnett and Lewis, 1994). Outliers can greatly affect the results, depending on their number, their numeric magnitude and difference from the rest of the data. The ways of proceeding to identify outliers is through visual inspection or

using techniques such as standardised z-scores (Tabachnick and Fidell, 2012). In addition, scatter plots are commonly used to detect outliers (Hair et al., 2009; Pallant 2010).

Homoscedasticity and linearity

Homoscedasticity and linearity were assessed by analysing the scatterplots for every couple of variables used in the relationships modelling the hypotheses of this research. Hair et al. (2009) and Pallant (2010) recommend checking the shape of the scatter plot. If the dots of the plot are arranged with the shape of a 'narrow cigar' (Pallant, 2010, pp. 131), homoscedasticity is suggested. Linearity was also checked through the same scatter plots, resulting in dots shaping straight lines. The results of the inspections on these plots strongly suggest that data collected accomplishes with these attributes.

Normality

Normality is one of the most common assumptions of statistical techniques such as SEM (Hair et al., 2009). Without normality, the results obtained using SEM might not be reliable. In order to assess normality, kurtosis and skewness analyses must be performed (Hair et al., 2009; Tabachnick and Fidell, 2012). Kurtosis is a measure of the peakedness or flatness of the distribution of the data collected, which can be appreciated in plots. Kurtosis values close to zero indicate a normal distribution; positive kurtosis indicates a high peak and a high clustering of the data (De Vaus, 2002); negative kurtosis reveals distributions that are usually flat and less clustered. Skewness reflects the level of symmetry of the distribution (De Vaus, 2002). Skewness values of zero reflect distributions completely symmetrical. Positive skewness reveals a distribution concentrated mostly to the left of the distribution. Conversely, negative skewness indicates that the resultant distribution is much more concentrated to the right (De Vaus, 2002; Black, 2003).

Multicollinearity

Sometimes the data obtained from different variables can be highly correlated, affecting the predictive power of the model, since it becomes very difficult to identify the independent effects of these variables (De Vaus, 2002). When the correlation is higher than 0.9 between two or more variables, they are considered to be measuring the same construct (Pallant, 2010). Multicollinearity problems must be checked before analysing data through more advanced techniques such as multiple regressions and SEM, because the results obtained under these circumstances might not be reliable.

3.4.2 Validity and reliability

The scales adopted to measure information must be carefully examined in relation to validity and reliability, so that the conclusions obtained can be trusted (Mentzer and Flint, 1997). Validity is defined as the extent to which a certain scale measures what it is intended to measure (De Vaus, 2002). Reliability is associated with the consistency between the results obtained through the same scales on different occasions. If questions are responded to in the same way at several opportunities, the scale will be considered reliable (De Vaus, 2002).

3.4.2.1 Validity

There are four different ways of assessing scale validity: face validity, content validity, criterion-related validity and construct validity (Choo, 1993; De Vaus, 2002; Black, 2003). Face validity is the extent to which the scale looks like being a suitable instrument to measure the construct (Dillman et al., 2008). Face validity usually can be assessed by individuals from the sample and experts on the field. Content validity represents the extent to which the scale truly measures the concepts and ideas intended to be measured (De Vaus, 2002; Black, 2003). In other words, content validity is associated with

the question of how complete the scales' items are as a representation of the social construct that is being measured. It is argued that there is no way to measure content validity directly, but one of the common methods for assessing a scale's content validity is to review the literature to make sure that the items adopted in the scale are complete and appropriate (Black, 2003). For this study, the reasons explaining the adoption of every construct are provided in section 3.2, along with the supporting literature. Most scales used in this study were used previously in environmental management studies, lending some support for content validity. Face validity and content validity were also assessed when "piloting" the questionnaire as described previously in section 3.3.6 (DSE, WFA, WGGA).

The next aspect of validity is construct validity, which is associated with the level of precision of the scale developed in the assessment of the social construct (Kerlinger, 1986; Zikmund, 2000). It can be defined as the extent to which scales items relate to each other, representing a measure for the same construct (Wong, 2002; Black, 2003). Construct validity can be classified into convergent validity and discriminant validity. To test convergent validity in the scales adopted in this study, it was necessary to use confirmatory factor analysis in order to demonstrate that the theoretical frameworks used to develop the scales items were suitable. The condition for assuring convergent validity is that the items of a certain scale must correlate positively with each other (Churchill, 1979). Discriminant validity is the complement of convergent validity. The objective of discriminant validity is to be able to discriminate precisely between items of the scale that should not be related (De Vaus, 2002; Black, 2003). Hair et al. (2009) state that the best way of assessing discriminant validity is to compare the square root of the variance-extracted percentages for any two constructs with the correlation estimate between these two constructs. The criterion to determine discriminant validity specifies that the square root of the variance-extracted must be greater than the correlation between the constructs. This method is based on the idea that a latent construct should explain most of the variance of the observed variables composing it, or at least greater

variance than other latent variables which are able to explain for the same observed variables (Bagozzi and Yi, 1988). Every value for the variance-extracted between constructs must be higher than 0.5.

Criterion-related validity is testing the scale against another instrument or criterion, checking how well they coincide. In criterion-related validity, the researcher makes a prediction about the relationship between the construct and the criterion, based on the theory. There are two categories: concurrent and predictive validity (Black, 2003). Concurrent validity uses data collected at the same time for the scale and the criterion. Predictive validity assesses the scale by comparing data obtained at certain moment with data obtained at some point of the future (De Vaus, 2002; Wong 2002; Black, 2003). For the present study, concurrent validity will be used, since all the data were obtained using a single survey.

Unidimensionality analysis is also an aspect that needs to be evaluated in order to assure validity (De Vaus, 2002; Wong, 2002). According to Hatti (1985), unidimensionality refers to the extent to which all the items are measuring the same concept or “psychological variable” (Hatti, 1985, pg. 139). Usually, unidimensionality can be assured by the researcher if all the items of the scale used are selected carefully (Wong, 2002; Chowdhury, 2011).

3.4.2.2 Reliability

The concept of reliability is commonly associated with the level of random errors affecting the scale developed (Pallant, 2010), so that a scale with high reliability will have a low level of random errors affecting it. The way of testing reliability is through the internal consistency of the scale, a technique related to the extent to which all the items in the scale are measuring essentially the same concept. Usually, internal consistency is measured through Cronbach’s Alpha coefficients, which are between 0 and 1 (the higher the coefficient, the more reliable the scale). Nunnally (1978) suggests that a scale is

reliable if Cronbach's Alphas are larger than 0.7. For scales with a reduced number of items, Pallant (2010) recommends measuring reliability through the mean inter-mean correlation between the items of the scale.

3.4.3 Confirmatory Factor Analysis

Confirmatory factor analysis (CFA) is a statistic procedure aimed at assuring the consistency of the measures used by researchers to represent the desired psychological object (Kline, 2010). In other words, CFA is used to test how well the items proposed *a priori* by the researcher and the literature represent a reduced number of constructs, and how well these representations are supported by the data (Tharenou et al., 2007; Hair et al., 2009).

CFA procedures allow confirming the structure of items of the scale based on theoretical definitions, and the performance of CFA is absolutely necessary to establish convergent validity, as well as reliability, before testing a causal model (Hair et al., 2009). To study convergent validity, the researcher must consider the factor loadings obtained after performing CFA. High factor loadings suggest that all of them converge on some common point (Hair et al., 2009). Hair et al. (2009) and Tharenou et al. (2007) suggest that ideally loadings should be higher than 0.4 or 0.5 to assure convergent validity for the items composing the construct. In addition, using CFA, unidimensionality can also be determined.

In this study, CFA was performed using AMOS, to check the level of consistency between the constrictions imposed by the researcher and the data obtained. If this consistency is satisfactory, the model proposed is considered to "fit", a conclusion determined by the analysis of several fitness indices (Podsakoff and Mackenzie, 1994). Usually, the most commonly used indices are the ratio between Chi-Square and the degrees of freedom of

the model, the Root Mean Square Error of Approximation (RMSEA), the Comparative Fit Index (CFI) and the Standardized Root Mean Residual (SRMR). A more complete explanation of these indices will be provided in the next section. Details about these calculations will be provided in the next chapter of this thesis.

One important aspect of CFA is its application to the two-step SEM approach (Anderson and Gerbing, 1988). This process seeks to analyse and to first test “the fit and construct validity of the proposed measurement model” (Hair et al., 2009, p.848), which is performed using CFA. Once the measurement model has been properly validated, the next step is to test the structural model, which involves the testing of the relationships between latent variables. The two-step approach is based on the need to separate the measurement model from the structural model (an issue that will be described in the next section) for making sure that the analysis of the data is being conducted with good measures, since the analysis of just the structural model is not enough for this. If the analysis of the measures (CFA) does not provide good results, researchers should refine these measures (Hair et al., 2009).

3.4.4 Common method variance

Common method variance is the name received by the source of errors introduced by measuring variables using the same method. In this sense, the fact of measuring variables at the same time, using the same questionnaire or the same rating scales, may cause the relationships between variables in the model to be overestimated (Tharenou et al., 2007). Common method variance is usually present when using self-report for variables measurement, as in the present study. In order to assess common method variance, the common latent factor method was used (Podsakoff et al., 2003). This method consists of adding an extra variable to the CFA model, which is linked to every single item (observed variables). This new model must fit, and additionally, the difference between the standardised regression weights obtained with this new model (using the new latent variable) and the ones obtained with the original model should be less than 0.2

(Podsakoff et al., 2003). If the differences are larger, this is a strong indication that common method variance is affecting the data.

3.4.5 Multivariate analysis of variance (MANOVA)

When analysing data, especially from surveys, it is important to be able to distinguish differences caused by factors that can have an effect on the responses. For example, in the case of this research, factors such as the size of the winery or its geographic location might have an effect on the responses of the managers. In these cases is necessary to compare differences in the variables of the model between 2 or more groups, which can be done performing multivariate analysis of variance (MANOVA). The MANOVA test compares the differences between more than two groups, revealing if these differences are caused by chance or by the effect of variables, such as size, for example. These tests assume that the groups come from independent and normally distributed populations with the same variance (Tharenou et al., 2007).

3.4.6 Structural Equation Modelling

The research model proposed in this research was tested and analysed using the statistical technique known as structural equation modelling (SEM). Hair et al. (2009) describe SEM as a technique focused on determining multiple regressions estimated at the same time. SEM is also understood as a way of estimating causal relationships between latent, or unobserved, variables measured by several manifest or observed variables, taking a confirmatory approach (Wong, 2002; Byrne, 2006). Observed variables are the results obtained at the data collection stage for every item. One of the major advantages of using SEM is that this statistical method addresses explicitly errors in parameters, in contrast to alternative methods which are not capable of managing these

errors, which leads to all kinds of inaccuracies (Byrne, 2006). All the calculations involving SEM were performed through AMOS, included the design of the research model.

3.4.6.1 Latent and observed variables

SEM is able to work with both observed and latent variables. Latent variables are the constructs that are not possible to observe directly. Examples of these variables are intelligence or motivations. For this reason, researchers must try to measure these variables in some other way, and this is done usually by linking these latent variables to others that are observable. Observed or manifest variables refer then, in the context of SEM, to the variables that serve as indicators or measurements of the latent or unobserved variables (Byrne, 2006; Hair et al., 2009).

3.4.6.2 Exogenous versus endogenous latent variables

Exogenous latent variables are the equivalent of independent variables, as they are affected by external factors that are not determined by the model. Endogenous latent variables are the same as dependent variables, since they are affected by the exogenous latent variables (directly or indirectly). It is argued that endogenous latent variables are explicated by the model because all the factors affecting them are considered within the boundaries of the model (Byrne, 2006; Hair et al., 2009).

3.4.6.3 The general SEM model

In AMOS, SEM models can be depicted graphically using four geometric symbols: circles, squares, single-headed arrows and double-headed arrows. Circles represent latent variables (unobserved), squares mean observed variables, single-headed arrows mean the relationships between variables and double-headed arrows mean covariances between pairs of variables (Byrne, 2006)

SEM models can be described as having two components, the measurement model, which shows the way latent variables are explained by observed variables, and the structural model (or path model), which describes the relationships between independent and dependent variables based on the theoretical framework used by the researcher.

3.4.6.4 Goodness-of-fit measures

Along with results, researchers also must be aware about the validity of the model. To ensure that model is valid, several indices must be considered. The goodness-of-fit (GOF) of the model represents “how well the model reproduces the covariance matrix among the indicator items (i.e., the similarity of the observed and estimated covariance matrices)” (Hair et al., 2009, p. 745).

The following are the most used absolute fit indices in management literature:

- Normed Chi-Square: This index is the division between Chi-Square and the degrees of freedom of the model. Usually, ratios less than 3 are accepted for good-fitted models (Hair et al., 2009). It can be sensitive to the sample size.
- Root mean square error of approximation (RMSEA): This is another index that attempts to be independent of sample size (in contrast to the chi-square test statistic). Good values are those lower than 0.1 (Hair et al., 2009).
- Incremental fit indices (IFI): are associated with the assessment of the extent to which a certain model fits in comparison to other models. Usually, the model to have in mind for this comparison is the null model (all the variables uncorrelated). The following indices are the most common:

- Comparative fit index (CFI): Similarly, CFI is also a comparative index, comparing the observed and predicted covariances matrices (Chi-Square index). Values should be over 0.9 (Hair et al., 2009).

3.5 Summary

This chapter presented a research model through the hypotheses and their relationships developed in the literature review. The research model was built in order to respond to the research questions that are the object of this work, related to managers' interpretations, their effect on environmental commitment and the environmental performance of the organisation. In the present chapter are also depicted all the elements of the research model, that is, the variables used, the way these variables were determined, and also the way they were measured.

Importantly, this chapter explains the way data were collected, describing all the practices aimed at elaborating the survey (a questionnaire), and the procedures intended to obtain responses from Australian wineries. The practices involved in improving the survey also were described, such as preliminary interviews and pilot studies, undertaken in order to receive suggestions, advice and feedback in general.

The last part of this chapter provided a description of the statistical tools and procedures that were used in the analysis of the data collected. Practices such as confirmatory analysis and structural equation modelling were described, along with suitable indices to assure the correctness of the research model. Validity and reliability issues related to the structure of the research model and the scales used were also described.

Chapter 4

4. Data Analysis

4.1 Introduction

The objective of this chapter is to present the analysis of the data obtained through the survey of Australian wineries. The survey instrument sought responses from 1,294 managers of wineries spread throughout Australia that were making wine in the same place (crushing grapes and bottling their own wine). The survey was completed by 184 managers, which represents 14.2% of the target population. Based on the data collected, the contents of this chapter are as follows:

- Firmographic description of the sample. Most of the characteristics analysed in this section are from the year 2011, since the survey was undertaken during the first half of 2012. The characteristics studied are the geographic location of the wineries that returned the questionnaire, the amount of their annual sales, their number of employees, the tonnage of grapes crushed, the age of the wineries and the position of the person who responded.
- Descriptive statistic. This section describes variables that are part of the research model, such as mean scores, the standard deviation and issues related to the assessment of the normality of the distribution of the responses, such as skewness, kurtosis and the analysis of the normality plot.
- Data screening. This section is dedicated to explaining and describing the development of the actions performed in order to guarantee that issues such as missing data and outliers do not affect the integrity of the data and the quality of the conclusions drawn.

- Construct validity and reliability. This section describes the methods for testing the validity and reliability of the constructs, in particular the way in which Confirmatory Factor Analysis (CFA) was performed and the results obtained from this technique.
- Testing of hypotheses. After testing the model fit using CFA, the structural model is analysed using SEM, in order to assess the hypotheses proposed by the model.

4.2 Firmographic description

This section describes the firmographic characteristics of the sample. These characteristics are the location of the winery in Australia (by State), the tonnage of grapes crushed during the previous year (2011), annual sales during the previous year (2011), the number of employees working in the winery, the age of the winery and the role of the respondents in the winery.

The responses collected were obtained from all Australian states, except for the Northern Territory and Australian Capital Territory, since there are no wineries operating in those areas. The climate and lack of water are the main reasons for the absence of wineries in the Northern Territory, and the extent of land in the Australian Capital Territory is insufficient for establishing wineries. Almost 80% of the survey's responses were obtained from wineries located in Victoria, South Australia and New South Wales (Table 4). Table 4 also shows, in percentages, the location of wineries in the total population (wineries making wine on site, a total number of 1,294) (The Australian and New Zealand Wine Industry Directory, 2011). Data in Table 4 appears to show that the distribution of sample, by State, is similar to the overall population.

Table 4: Location of respondent wineries in Australia

Winery location	Frequency obtained	Percentage obtained	Location of the population (percentages)
New South Wales (NSW)	35	19.1	22.7
Queensland (QLD)	4	2.2	3.8
South Australia (SA)	41	22.4	21.8
Victoria (VIC)	70	38.3	33.5
Tasmania (TAS)	9	4.9	5.8
Western Australia (WA)	24	13.1	12.4
Missing data	1	0.5	-
Total of responses	184	100	100

Winery managers were also requested to provide information regarding the tonnage of grapes crushed during the previous year (2011). The ranges for this classification were taken from The Australian Wine Industry Directory (2011). Half the wineries in this study (50.8%) stated that they crush less than 100 tonnes of grapes annually and just nine wineries declared that they crushed more than 2,500 tonnes of grapes per year (large companies) (Table 5). The fourth column of Table 5 shows the distribution of the wineries in the total population of this study (wineries making wine on site) in relationship to the percentage of tonnes of grapes crushed. These percentages are similar to the distribution of the sample, with 54.7% crushing less than 100 tonnes (small wineries according to The Australian Wine Industry Directory, 2011). The volume of responses obtained from small wineries reflects their large number in the Australian wine industry.

Table 5: Tonnes of grapes crushed per year

Tonnes of grapes crushed	Frequency	Percentage	% of population
Less than 10 tonnes	24	13.1	13.8
Between 10 and 19 tonnes	24	13.1	14.4
Between 20 and 49 tonnes	29	15.8	14.8
Between 50 and 99 tonnes	16	8.7	11.7
Between 100 and 249 tonnes	26	14.2	13.2
Between 250 and 499 tonnes	29	15.8	12.3
Between 500 and 999 tonnes	13	7.1	8.5
Between 1,000 and 2,499 tonnes	13	7.1	5.1
2,500 tonnes and more	9	4.9	6.2
Missing data	1	0.5	-
Total responses	183	100	100

The results shown in Table 4 and Table 5, for location of the wineries and tonnes of grapes crushed show an important similarity between the sample and the 1294 wineries that are the population of this study, suggesting that the sample was reasonably representative of the population.

The next firmographic characteristics examined have an informative rather than a comparative role, since it was not possible to find related information about the population of the study. In the case of annual sales, 63.3% of respondent organisations have sales of under \$1 million dollars per year (Table 6). According to the Australian Taxation Office (ATO), these respondents are considered 'small businesses (Australian Taxation Office, 2013). Of the 184 responses received, 172 managers responded to this question; 12 managers did not respond to this question.

Table 6: Level of sales for respondent wineries in Australia

Annual sales (2011)	Frequency	Percentage
Less than \$100,000	43	25.0
\$100,000-499,999	41	23.8
\$500,000-999,999	25	14.5
\$1,000,000-2,499,999	31	18.0
\$2,500,000-4,999,999	17	9.9
\$5,000,000 and more	15	8.7
Missing data	12	6.5
Total of responses	172	100.0

The number of employees in the organisation is another factor that can be used to profile businesses. According to the *Fair Work Act 2009* (Commonwealth), small businesses are those that employ 15 or fewer people. For the present study, taking into consideration this segmentation, it is possible to state that the respondents are mostly wineries considered to be small businesses, because 74.3% of them fall into this category (Table 7). This situation is very common in Australia and in other leading wine producing countries, where a significant percentage of the industry is composed of wineries that are family-sized, characterized as ‘boutique wineries’ and specializing in delivering products of high quality in low volumes.

Table 7: Number of employees working in respondent wineries

Number of employees	Frequency	Percentage
Less than 15	136	74.3
Between 16 and 200	45	24.6
More than 200	2	1.1
Missing data	1	0.5
Total of responses	183	100

The age of the wineries that responded to the survey was another characteristic measured (based on the Australian Wine Industry Directory), and this is shown in Table 8. Almost 70% of the wineries surveyed have operated for more than ten years, suggesting that these organisations have had time enough to implement environmental policies.

Table 8: Age of respondent wineries

Years of Operation	Frequency	Percentage
Less than two years	2	1.1
Between two and five years	19	10.4
Between five and ten years	34	18.7
More than ten years	127	69.8
Missing data	2	1.1
Total of responses	182	100

The last firmographic variable, the role of managers who responded the survey, is shown in Table 9. Almost 65% of respondents were owners, CEOs or general managers of their winery. The second important set of participants in the survey was winemakers, with almost 20% participation. It is important to note that these roles are considered to be the most significant at the time of making any decision about what level of environmental commitment should be adopted by the organisation (Hojman, 2006). Along with managers, winemakers also share a greater percentage of responsibility in the execution of policies, because it is according to their expert criteria that wineries decide about the most suitable technologies and techniques for producing high quality wine (World Food and Wine, 2013). In this sense, these roles are suitable for answering the questions in the survey. The row “Other” in Table 9 includes valid responses by other organisational managers.

Table 9: Role of respondents in wineries

Role of respondents	Frequency	Percentage
Owner/CEO	99	53.8
Winemaker	36	19.6
General Manager	20	10.9
Operations Manager	9	4.9
Viticulturist	7	3.8
Environmental Manager	3	1.6
Other	10	5.4
Total of Responses	184	100

4.3 Data screening for the variables used in the research model

4.3.1 Missing values

The missing data for each case for this study are presented in Table 10, which reports on the 184 responses obtained.

Table 10: Summary of missing data by cases

Number of missing data per case	Number of cases	Percentage of missing data in the case	Percentage of cases
0	176	0.00	95.65
1	3	2.44	1.63
2	3	4.88	1.63
3	2	7.32	1.09

According to Hair et al. (2009), cases with 10% or less of missing data should not represent a problem for techniques such as SEM. Considering that the total number of

items to measure in the survey is 41, there are no cases which exceeded 10% (third column, Table 10). Table 11 shows a summary of the variables with missing cases, indicating that there is not a high volume of missing data, and this does not seem to be specially concentrated in any variable. Hair et al. (2009) suggest considering variables for deletion if they have 15% or more of missing cases, which is not the case in this study. Therefore, all cases were kept and no removal of data was performed.

Table 11: Summary of missing data by variables.

Variable	Missing cases	Percentage
Environmental Commitment (5)	1	0.54
Stakeholders (2)	1	0.54
Attitudes (2)	1	0.54
Environmental Performance (4)	1	0.54
Information Scanning (3)	1	0.54
Environmental Commitment (11)	2	1.09
Environmental Performance (3)	2	1.09
Stakeholders (4)	2	1.09
Information Scanning (7)	3	1.63

(The number in brackets shows the number of the item)

4.3.2 Outliers, homoscedasticity and linearity

The items in this study for each construct were measured using a five-point Likert scale. Hence, the assessment of outliers was done firstly through visual inspection, to verify that every value was within the scale. This was complemented by the analysis of box plots. Finally, according to Tabachnick and Fidell (2012), outliers can be identified considering absolute values of z-scores, and every value over the threshold of 3.29 can be considered an outlier. After applying these steps, no value was identified as an outlier in any of the variables.

4.4 Descriptive statistics for variables

The previous section described firmographic characteristics such as geographical information, number of employees, role of respondents and size in sales and production of respondent wineries. This section describes the important statistics of the variables that are part of the research framework, modelled in order to answer the questions that motivate this research. These variables were measured through the questionnaire described in Chapter 3 (Research Methods) to which the managers of the Australian wineries that were part of the sample responded.

In this section it will be also examined the normality of the variables. Most multivariate analysis techniques, such as SEM, require the data to be normally distributed, and the criterion to assess normality in the present study consists on analysing the values obtained for skewness and kurtosis for each of the variables of the model (Tables 12 to 19), which must be within the range of ± 2.58 (Hair et al., 2009).

4.4.1 Environmental commitment

These items that measure environmental commitment were grouped into four dimensions based on the classification proposed by Gonzalez-Benito and Gonzalez-Benito (2005), as described in section 3.2.5. Given this structure, environmental commitment is presented as a second-order factor construct, and this structure will be tested during CFA (section 4.6.1).

Table 12: Descriptive statistics for the level of environmental commitment adopted by the organisation, based on a five-point Likert scale

Descriptive Statistics					
	Item	Mean	Standard Deviation	Skewness	Kurtosis
Planning and Organisational	Environmental protection is one of the basic values of your winery's policies.	4.12	0.90	-0.96	0.48
	It is clearly established who on the staff at your winery assumes the environmental responsibilities.	3.95	0.86	-0.83	1.05
	The employees at your winery receive training on environmental issues.	3.46	0.92	-0.22	-0.46
	The environmental objectives are perfectly defined at your winery.	3.44	1.03	-0.33	-0.64
	The budget for environmental investment represents an important percentage of the total investment budget of your winery.	3.13	1.05	-0.08	-0.82
Operational practices: Processes	Your winery uses some environmental impact correction measures such as, purifiers, waste treatment, and/or recycling, soil restoration, air filters, water treatment.	4.10	0.76	-1.07	2.03
	At your winery, technologies are used that minimize water consumption	3.99	0.83	-0.85	0.81
	At your winery, technologies are used that minimize the pollution produced and that prevent a subsequent purification and/or waste treatment process.	3.97	0.79	-0.49	-0.10
Operational practices: products	Your winery attempts to substitute the most harmful pesticides with less damaging alternatives.	4.46	0.76	-1.44	1.77
	Your winery attempts to substitute fertilizers that pollute the most with others that pollute less.	4.18	0.89	-1.07	0.78
	Your winery attempts to substitute the raw materials/products used that pollute the most with others that pollute less.	4.10	0.78	-0.66	0.16
Communication	Your winery reports its environmental behaviour to its consumers	3.15	1.12	-0.20	-0.83
	Your winery periodically prepares an environmental report for the shareholders or owners.	2.78	1.02	0.24	-0.26
	The environmental measures adopted by your winery are certified.	2.72	1.28	0.45	-0.87
	Your winery requires its suppliers to be environmentally certified.	2.54	1.00	0.41	-0.05

The items measuring environmental commitment can be observed in Table 12, along with their mean, standard deviation, skewness and kurtosis. It can be noted that the dimension with the items with the highest means is “operational practices”, particularly those focused on products. These items are related to the substitution of polluting elements in wineries such as artificial fertilisers and pesticides, which is consistent with the practices associated to the production of organic wine, for which there is a growing market (Hinckley and Matson, 2011).

Values for skewness and kurtosis depicted in Table 12 are all within the range of ± 2.58 , ensuring normality.

4.4.2 Environmental performance

The mean, standard deviation, skewness and kurtosis of the items of environmental performance are presented in Table 13. When managers were asked to self-assess the environmental indices presented in the survey on a scale from 1 to 5 according to the performance of their winery, and comparing them against the wine industry averages, those evaluated best were the indices related to substitution of harmful pesticides, water consumption and substitution of hazardous inputs. This is similar to the results obtained for environmental commitment discussed in the previous section, meaning that respondents consider that they are doing more in terms of replacing environmental harmful raw materials and water management than the rest of the industry. The indices that were evaluated worst were air emissions reductions and consumption of waste internally, which have traditionally been a problem for wineries, but that can be fixed quickly once the winery adopts suitable environmental practices (Cordano, 2009; Marshall et al., 2010).

In particular, the low assessment received by the item ‘consumption of waste internally’ is a topic that is interesting in wineries. Although there are studies highlighting the uses and advantages of the by-products of wine, such as grape pomace (a source of natural

antioxidants and soil conditioners) (Arvanitoyannis et al., 2006) or grape seeds (a nutritional supplement) (Gonzalez-Paramas et al., 2004), and the global wine industry is beginning to realise the economic benefits of these wastes, it seems that the Australian wine industry has not yet become involved in these activities.

Table 13: Descriptive statistics for Environmental performance, based on a five-point Likert scale

Descriptive Statistics				
Item	Mean	Standard Deviation	Skewness	Kurtosis
Substitution of harmful pesticides	3.75	1.04	-0.60	0.02
Water consumption reduction	3.60	0.86	-0.41	0.05
Substitution of hazardous inputs	3.57	0.87	-0.10	0.08
Recycling	3.55	0.85	-0.29	-0.27
Reduction of solid wastes	3.48	0.86	-0.22	0.07
Reduction of liquid wastes	3.45	0.85	-0.14	-0.12
Energy savings	3.40	0.91	-0.07	-0.22
Consumption of waste internally	3.36	0.83	0.12	-0.23
Air emissions reductions	3.28	0.74	0.58	0.74

Values for skewness and kurtosis depicted in Table 13 are all within the range of ± 2.58 , ensuring normality for this variable.

4.4.3 Attitudes towards environmental commitment

The descriptive statistics for the managers' attitude towards environmental commitment are shown in Table 14. In general terms, since all the scores were high, it is possible to state that most managers in the sample feel that the adoption of actions related to environmental commitment can have potentially positive impacts on the organisation.

Table 14: Descriptive statistics for managers' attitudes towards environmental commitment, based on a five-point Likert scale

Descriptive Statistics				
Item	Mean	Standard Deviation	Skewness	Kurtosis
Managers believe benefits will be derived from actions that preserve the environment	4.10	0.76	-0.10	1.80
Managers label actions that preserve the environment as having positive implications for the firm	4.08	0.65	-0.57	0.44
Managers perceive actions that preserve the environment as a potential gain	4.04	0.63	-0.32	0.04
Managers feel the future of the firm will improve as a consequence of actions that preserve the environment	3.88	0.93	-1.00	1.02

Values for skewness and kurtosis depicted in Table 14 are all within the range of ± 2.58 , ensuring normality.

4.4.4 Stakeholders

As was described in Chapter 3, the element of perceived norms (proposed by TPB) is usually considered to be the pressures of environmental stakeholders as perceived by managers, when studying environmental commitment as behaviour (Cordano and Frieze, 2000; Papagiannakis and Lioukas, 2012; Rivera-Camino, 2012). The descriptive statistics for this variable are shown in Table 15. The results show that managers consider that the most important sources of pressure for adopting environmental commitment are consumers and citizens/communities. The importance of consumers for adopting environmental commitment is not surprising, since there are studies highlighting the change of preferences of consumers towards products manufactured in environmentally-friendly ways (Klassen and Vachon, 2003; Sarkis, 2003; Zhu and Sarkis, 2006; Sarkis et al., 2010).

Table 15: Descriptive statistics for stakeholders, based on a five-point Likert scale

Descriptive Statistics				
	Mean	Standard Deviation	Skewness	Kurtosis
Consumers	3.69	0.96	-0.71	0.30
Citizens/communities	3.53	0.97	-0.62	0.16
Employees	3.46	0.94	-0.38	-0.26
Government	3.27	1.00	-0.31	-0.28
Public media (newspapers, trade articles, TV, radio, etc.)	3.25	0.94	-0.40	-0.16
Wine and grapes associations	3.19	0.88	-0.52	-0.24
Environmental groups	3.15	0.97	-0.23	-0.37
Competitors	3.02	0.89	-0.37	0.10
Suppliers	2.73	0.81	0.04	-0.37

Values for skewness and kurtosis depicted in Table 15 are all within the range of ± 2.58 , ensuring normality.

4.4.5 Perceptions of control of the management team on environmental commitment

The next variable to analyse is the perception of control that managers feel they have over environmental issues. The two items of the scale measuring the managers' perception of control obtained relatively similar scores (Table 16).

Table 16: Descriptive statistics for perceptions of control on environmental commitment, based on a five-point Likert scale

Descriptive Statistics				
Item	Mean	Standard Deviation	Skewness	Kurtosis
The management team has a choice about whether or not to implement actions that preserve the environment	3.76	0.82	-0.74	0.83
The management team feels it has the capability and technical knowledge to implement actions that preserve the environment	3.61	0.77	-0.33	-0.21

Values for skewness and kurtosis depicted in Table 16 are all within the range of ± 2.58 , ensuring normality.

4.4.6 Information scanning effort

The last variable assessed was information scanning effort, which considers the collection of the information and its further analysis. The mean, standard deviation, skewness and kurtosis in each of the items of the survey measuring information scanning effort are shown in Table 17. It can be noted that the items with the highest score (mean) are related to the process of collection of the information, revealing that this process is actively and intentionally performed by most managers, in contrast with some managers who could be receiving information in a passive way. These results are in accordance with the statements of Jain (1984) and Maheran et al. (2009), who argue that data collection is highly important for the acquisition of competitive advantage for the organisation. The lowest scores, on the other hand, are related to the use of pre-established methodologies to search for information (mean=2.84), which means looking systematically for information in a formal way (for example using data mining tools to look for market trends, or competition intelligence). This might mean that managers tend to look for information according to their current needs, without having a formal and specific way of searching. In addition, the likelihood of incorporating the new scanned information into

the environmental strategy was scored with a mean of 2.86, suggesting that managers are probably selective with the assessment of new information, or also that relevant information (which is worth adding into the organisational strategy) tends to be obtained with low frequencies.

Table 17: Descriptive statistics for Information Scanning Effort, based on a five-point Likert scale

Descriptive Statistics				
Item	Mean	Standard Deviation	Skewness	Kurtosis
Managers make a deliberate effort to search for information about environmental care	3.55	0.92	-0.80	0.47
Managers search for information about environmental care on a regular basis	3.45	0.96	-0.52	-0.08
Managers focus the searching effort on specific areas considered crucial regarding environmental care (environmental practices, legal aspects, clean technologies, etc.)	3.33	0.93	-0.63	-0.33
The information found is always analysed	3.20	0.94	-0.26	-0.15
The information found is always stored	3.14	0.90	-0.06	-0.73
The information found is always understood	3.12	0.85	-0.02	-0.38
Once the information has been processed (analysed, understood and stored), it is always incorporated into the environmental strategy	2.86	0.85	0.33	-0.10
Managers use a pre-established methodology to search for information about environmental care	2.84	0.90	0.23	-0.12

Values for skewness and kurtosis depicted in Table 17 are all within the range of ± 2.58 , ensuring normality.

4.5 Data reduction, analysis of validity and reliability

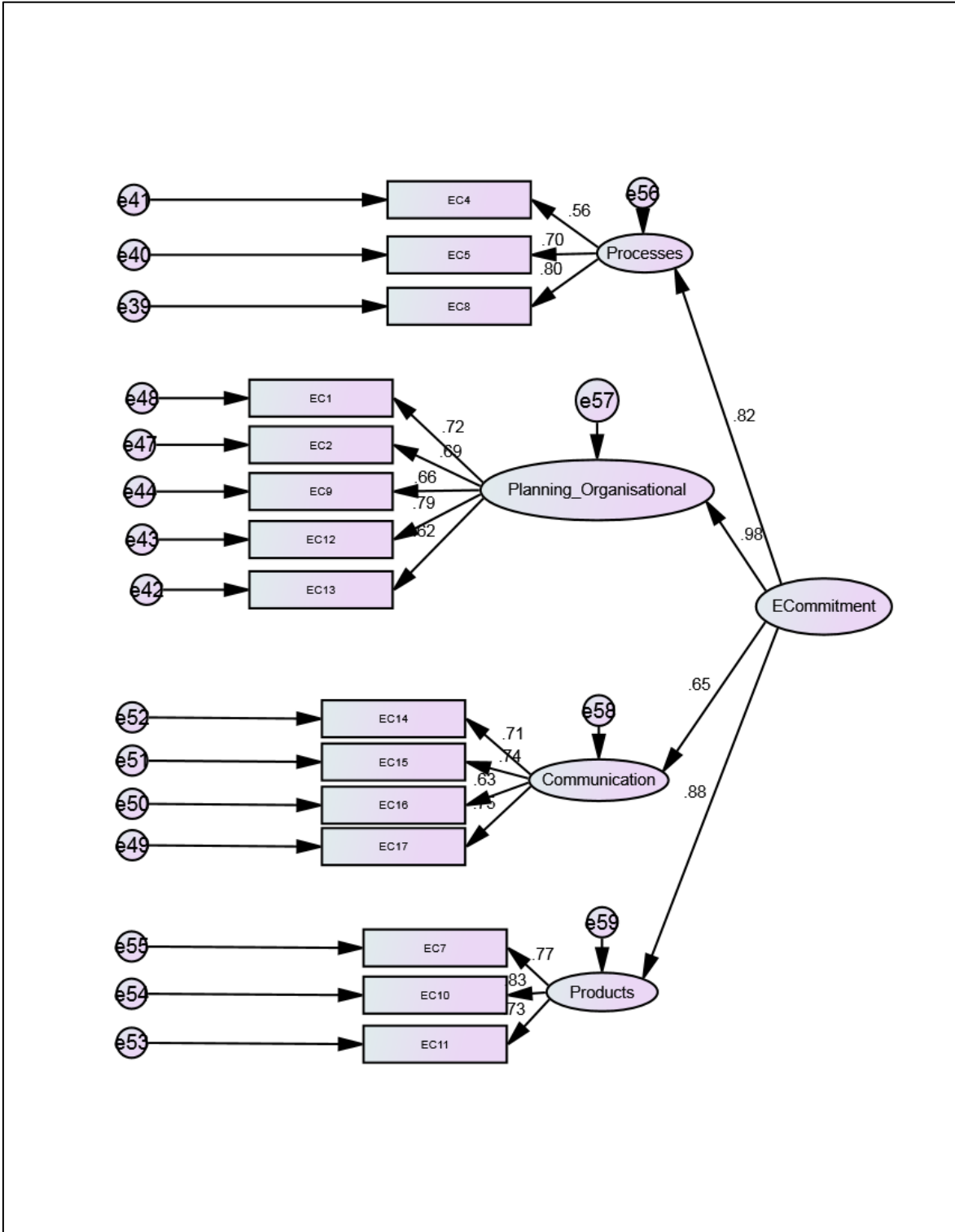
4.5.1 Confirmatory Factor Analysis

Confirmatory factor analysis (CFA) is usually undertaken in order to test how well the items proposed *a priori* by the researcher and the literature represent a reduced number of constructs, and how well these representations are supported by the data (Tharenou et al., 2007; Hair et al., 2009). In CFA, researchers must assign the factors that are part of a bigger construct, based on the analysis and study of the relevant literature. After these structures are proposed, the results obtained after performing CFA allow the researchers to accept or reject the theory adopted by determining the extent to which the structures proposed match the data collected (Hair et al., 2009; Tabachnick and Fidell, 2012). CFA is the first stage of the “two-step SEM approach” described in Chapter 3 (Anderson and Gerbing, 1988) oriented to analyse the fit and construct validity of the model.

4.5.1.1 CFA for second order factor environmental commitment construct

CFA was performed first on the environmental commitment construct, since this has been proposed to be composed by four dimensions, as explained earlier in Chapter 4 (Gonzalez-Benito and Gonzalez-Benito, 2005). This construct was modelled as a second order factor (Figure 5).

Figure 4: CFA for environmental commitment construct



The results are within thresholds (Hair et al., 2009), with the following indices of fit:

- $\chi^2/df = 2.832$ (this value is satisfactory, since it is below 3)
- CFI = 0.91 (satisfactory, since it should be equal to or higher than 0.9)
- RMSEA = 0.095 (this value is satisfactory, since it is below 0.1)
- IFI = 0.90 (satisfactory, since it should be equal to or higher than 0.9)

The factor loadings for the items in each dimension are depicted in Table 18.

Table 18: Reliability values and factor loadings for the items in environmental commitment

Items	Factor Loadings
ENVIRONMENTAL COMMITMENT - OPERATIONAL PRACTICES: PROCESSES ($\alpha=0.723$)	
Adoption of technologies which decrease pollution	0.800
Technologies minimising water consumption	0.703
Adoption of environmental corrective measures	0.559
ENVIRONMENTAL COMMITMENT - PLANNING AND ORGANISATIONAL ($\alpha=0.828$)	
Environmental protection is one of the basic values for the winery	0.791
Perfectly defined environmental objectives	0.721
Staff training on environmental issues	0.690
Budget for environmental investments	0.662
Perfectly assigned environmental roles on the staff	0.619
ENVIRONMENTAL COMMITMENT - COMMUNICATION ($\alpha=0.8$)	
Suppliers required to be environmentally certified	0.754
Environmental certification	0.740
Environmental reports to shareholders	0.710
Environmental reports to consumers	0.635
ENVIRONMENTAL COMMITMENT - OPERATIONAL PRACTICES: PRODUCTS ($\alpha=0.821$)	
Substitution of fertilisers	0.832
Substitution of pesticides	0.767
Substitution of pollutant raw materials	0.731
ENVIRONMENTAL COMMITMENT ($\alpha=0.840$)	
OPERATIONAL PRACTICES: PROCESSES	0.819
PLANNING AND ORGANISATIONAL	0.984
COMMUNICATION	0.651
OPERATIONAL PRACTICES: PRODUCTS	0.879

These results confirm that the data collected fit the dimensions of environmental commitment proposed by Gonzalez-Benito and Gonzalez-Benito (2005). Therefore no item was dropped from the construct.

4.5.1.2 CFA for the main model

The CFA analysis for the main model revealed that some of the resulting indices of fit were not satisfactory. In particular, the CFI and IFI indices are below the 0.9 threshold.

- $\chi^2/df = 1.963$ (this value is satisfactory, since it is below 3)
- CFI = 0.863 (it should be higher than 0.9)
- RMSEA = 0.077 (this value is satisfactory, since it is below 0.1)
- IFI = 0.872 (it should be higher than 0.9)

Results showed that, in particular, the scale measuring stakeholders had some items with low loadings, which is an issue that might also affect the discriminant validity of the whole model. Although the reliability of the scale was high ($\alpha=0.849$), it was found that the loadings of the items of “wine and grapes associations” and “government” were lower than 0.5. Hair et al. (2009) suggest that every loading must be over 0.5 in order to be considered satisfactory. Wine and grapes associations and the government were also often mentioned by winery managers who were part of the survey pilot study (Chapter 3) as being not a strong source of pressure for adopting an environmental commitment, confirming the CFA results. Therefore, these elements were removed from the analysis.

This result suggests that managers might consider the government and wine and grapes associations as part of another category of stakeholders. It could be the case that these two agents are considered to be part of a more coercive group, different from the kind of pressures received from stakeholders such as customers or employees, for example.

In addition, part of this difference can be explained by the fact that historically the role of the government and wine and grapes associations in the adoption of environmental commitment is stronger for wineries located in the Old World (such as France or Italy) than for Australian wineries (Jordan et al., 2007). It is stated that Australian legislation is more permissive than in Europe in issues such as grape varieties that are allowed to be

grown, which deeply impacts on the amount of pesticides and fertilisers used, or in the amount of water and the kind of irrigation techniques used. These issues are part of the control system exerted by the European governments with the objective of protecting and preserving the “terroir” and the Geographical Indication (GI), concepts based on the idea that local conditions affect a wine’s characteristics. European wineries must satisfy several environmental practices before their governments endorse their products and wines are able to use the GI in their labels (Jordan et al., 2007). These kinds of restrictions are not so severe in Australia, and they might explain partially the reason why wineries’ managers do not consider governments and wine associations in the same categories than customers, for example, which are a source of pressure that seem to be more important for managers.

After the scale measuring stakeholders’ pressures was modified, the model fit improved, meeting the desired indices. The CFA model is illustrated in Figure 6, and the results obtained are shown in Table 19.

Figure 5: CFA model including all constructs

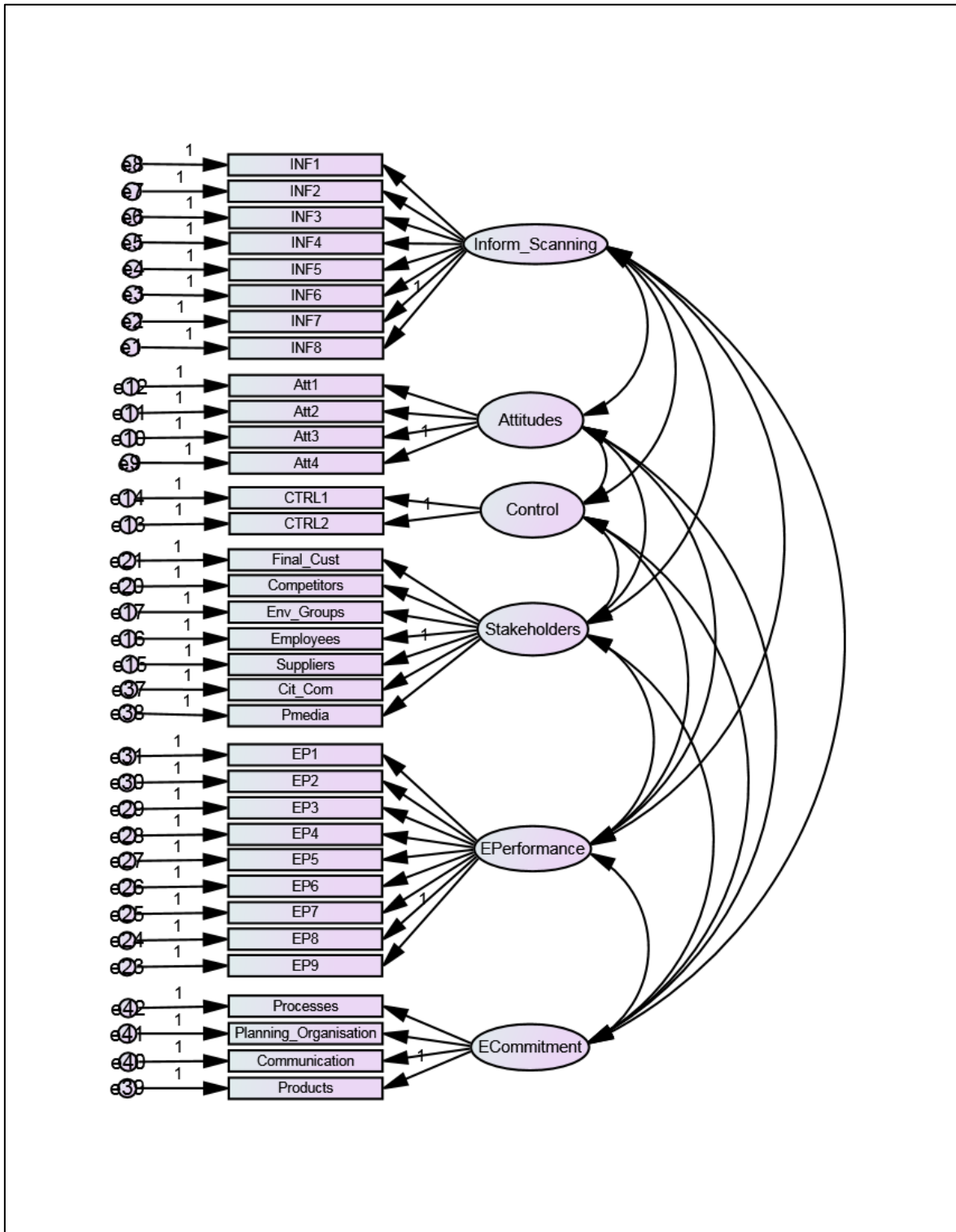


Table 19: Reliability values and factor loadings for the items of the scales

Scales	Factor Loading
INFORMATION SCANNING EFFORT ($\alpha=0.878$)	
The management team focuses the searching effort on specific areas considered crucial regarding environmental care (environmental practices, legal aspects, clean technologies, etc.)	0.791
The management team searches for information about environmental care on a regular basis	0.769
The management team uses a pre-established methodology to search for information about environmental care	0.743
The management team makes a deliberate effort to search for information about environmental care	0.72
The information found is always analysed	0.68
Once the information has been processed (analysed, understood and stored) it is always incorporated into the environmental strategy	0.558
The information found is always stored	0.541
The information found is always understood	0.517
ATTITUDES ($\alpha=0.878$)	
The management team believes benefits will be derived from actions that preserve the environment	0.859
The management team feels the future of the firm will improve as a consequence of actions that preserve the environment	0.825
The management team labels actions that preserve the environment as having positive implications for the firm	0.783
The management team perceives actions that preserve the environment as a potential gain	0.707
STAKEHOLDERS ($\alpha=0.833$)	
Public media	0.768
Environmental groups	0.751
Citizens/communities	0.673
Competitors	0.625
Consumers	0.593
Employees	0.58
Suppliers	0.518
CONTROL (Inter-Item Correlation = 0.458)	
The management team feels it has the capability and technical knowledge to implement actions that preserve the environment	0.758
The management team has a choice about whether or not to implement actions that preserve the environment	0.604

ENVIRONMENTAL COMMITMENT ($\alpha=0.840$)	
Planning and Organisational	0.892
Products	0.846
Processes	0.835
Communication	0.694
ENVIRONMENTAL PERFORMANCE ($\alpha=0.905$)	
Reduction of solid wastes	0.822
Reduction of liquid wastes	0.806
Consumption of waste internally	0.755
Recycling	0.753
Water consumption reduction	0.740
Air emissions reductions	0.706
Energy savings	0.673
Substitution of hazardous inputs	0.650
Substitution of harmful pesticides	0.542

The performance of CFA in AMOS showed that all the items loaded significantly, since they were all higher than the threshold of 0.5. This result confirms that the scales meet the requirements of unidimensionality and convergent validity (Hair et al., 2009; Tabachnick and Fidell, 2012). The indices of fit obtained through CFA are:

- $\chi^2/df = 1.676$ (the ideal is below 3)
- CFI = 0.906 (it must be higher than 0.9)
- RMSEA = 0.061 (it must be below 0.1)
- IFI = 0.905 (it must be higher than 0.9)

Since the resulting values for these indices are satisfactory, it is confirmed that the scales used and the model are robust. Reliability values for these scales are also good, since all Cronbach's alphas are higher than 0.7 (Hair et al., 2009). In addition, the composite reliability index was calculated using the following expression:

$$\text{Composite Reliability} = \frac{(\sum \lambda_i)^2}{(\sum \lambda_i)^2 + \sum \text{Var}(\varepsilon_i)}$$

where λ_i is the loading for every item i on its construct, and ε_i is the measurement error for every item i (Raykov, 1997). Results are shown in Table 20:

Table 20: Composite reliability for the constructs used in this study (excepting perceptions of control)

	Composite Reliability
Environmental Performance	0.908
Information Scanning	0.874
Attitudes	0.893
Stakeholders	0.834
Environmental commitment	0.865

Results in Table 20 are also satisfactory, since are over the threshold of 0.7. Since perceptions of control are measured using 2 items, its reliability was measured by the inter-item correlation, which was 0.458. This value, according to Hair et al. (2009), is also satisfactory, since these values must be over the threshold of 0.3.

4.5.2 Discriminant validity

Discriminant validity is the extent to which every construct is unique (Hair et al., 2009). The general idea of discriminant validity is to make sure that every construct captures different aspects of the issue under research.

The average variance extracted was calculated using the following expression,

$$\text{Average Variance Extracted} = \frac{\sum \lambda_i^2}{\sum \lambda_i^2 + \sum \varepsilon_i}$$

where λ_i is the loading for every item i on its construct, and ε_i is the measurement error for every item i (Zait and Berteau, 2011). The results obtained for discriminant validity are shown in Table 21.

Table 21: Discriminant validity. Average Variance Extracted and Correlation Estimates.
The square root of Average Variance Extracted is in the diagonal.

	AVE	ATT	STK	EP	EC	INF	CTRL
ATT	0.613	0.783					
STK	0.576	0.516	0.759				
EP	0.530	0.553	0.673	0.728			
EC	0.561	0.378	0.515	0.629	0.749		
INF	0.524	0.111	0.287	0.378	0.148	0.724	
CTRL	0.588	0.734	0.673	0.549	0.658	0.657	0.767

ATT: Attitudes, STK: Stakeholders, EP: Environmental Performance, EC: Environmental Commitment, INF: Information Scanning, CTRL: Control

The results obtained for the square root of the average variance extracted were higher than 0.5 (values in the diagonal) and also higher than the correlation estimates for every couple of latent variables (Hair et al., 2009; Tabachnick and Fidell, 2012). This means that discriminant validity is achieved for this study.

4.5.3 Common method variance

The test of common method variance is to analyse an additional model with a common latent factor, with the expectation that this will result in poor fit indices. When performed, it was found that this new model had, as expected, problems of fit, with indices of:

- $\chi^2/df = 4.722$ (the ideal is below 3)

- CFI = 0.854 (it should be higher than 0.9)
- RMSEA = 0.105 (it should be below 0.1)
- IFI = 0.839 (it should be higher than 0.9)

These results suggest that the threat of common method variance is minimal.

4.6 Variance in the research constructs across firmographic variables

This section assesses the way in which the variables used in the research model (information scanning effort, attitudes towards environmental issues, stakeholders' pressures, perceptions of control, environmental commitment and environmental performance) are affected by the firmographic parameters of the sample described earlier (the geographic location of the wineries, their annual sales, their number of employees, their tonnes of grapes crushed, their years of operation and the role of the persons who responded the survey). The object of this assessment is to be able to provide general conclusions about the relationships between the variables in the model regardless of the situational parameters. If differences in the variables are found in this regard, these are likely to weaken the generalisation of the conclusions. The assessment of the variables was performed using multivariate analysis of variance (MANOVA), which assumes normality, linearity, absence of outliers and multicollinearity, and homogeneity of variance-covariance matrices, all of which have been assessed.

The first effect to examine is the one caused by the geographic location of the winery on As described earlier, respondents came from the Australian states of New South Wales (NSW), Victoria (VIC), Queensland (QLD), South Australia (SA), Tasmania (TAS) and Western Australia (WA). Tasmania and Queensland were grouped into the category "Others", because of their reduced number of responses. The second variable is the annual sales of the wineries that responded to the survey, and this was classified in three

groups: 'less than \$1 million', 'between \$1 million and \$5 million' and 'more than \$5 million', based on the classification used in the Australian Wine Industry Directory. The third variable is the number of employees of the winery. The responses were classified in two groups: 'less than 15 employees' and 'more than 15 employees' (classification used by the *Fair Work Act 2009* (Commonwealth)). The fourth variable is the number of tonnes of grapes crushed by the wineries per year, classified in three categories: 'less than 100 tonnes', 'between 100 and 1000 tonnes' and 'more than 1000 tonnes', based on the classifications used in the Australian Wine Industry Directory. The fifth variable is the position of the respondents in the winery, classified in three categories: 'Top managers', that is, CEOs, owners and general managers; 'Mid managers', including operations managers, winemakers, viticulturists and environmental managers; and 'Others', which includes positions such as quality managers and health and safety professionals. Finally, the sixth variable is the age of wineries, classified in three groups: 'Less than 5 years', 'Between 5 and 10 years' and 'More than 10 years', based on the Australian Wine Industry Directory.

The results obtained are presented in Table 22. Since the significance of all the results was over the threshold of 0.05 (Tabachnick and Fidell, 2012), it can be concluded that the variables of the research model do not present significant differences across the categories of each of the firmographic variables examined.

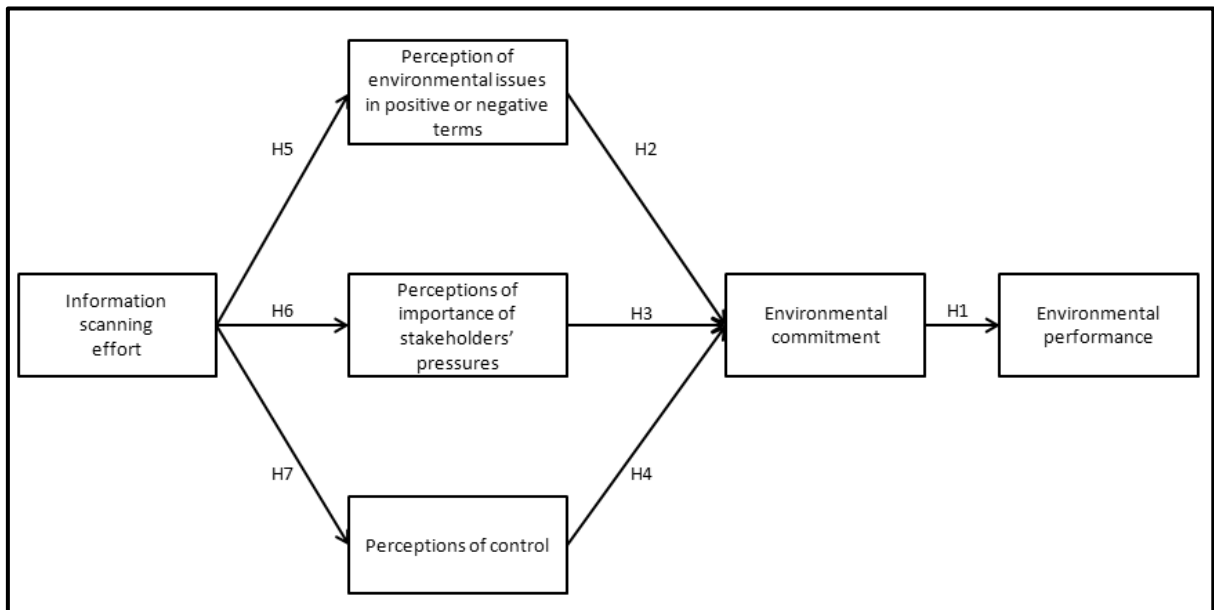
Table 22: Results of MANOVA for the group of variables used in the research model

Firmographic variable	Wilks' λ	partial eta squared	F	df	Error df	Significance
Geographic location	0.80	0.04	1.33	30	690	0.11
Annual sales	0.64	0.07	1.09	66	834	0.30
Number of employees	0.94	0.03	0.85	12	350	0.60
Tonnes of grapes crushed	0.63	0.07	1.33	60	880	0.07
Position of respondents	0.81	0.04	1.05	36	758	0.39
Age of the winery	0.90	0.04	1.04	18	490	0.41

4.7 Analysis of Structural Model

This section presents the results of SEM when testing the hypotheses of this research. The research model is presented in Figure 7. As presented in the Literature Review, this model looks to answer the question about the origin of the differences found in the level of adoption of environmental commitment levels in organisations that should have very similar levels of commitment (located close geographically, in the same industry and with common goals). In order to do this, the study examines the relationships between environmental commitment and environmental performance (Hypothesis 1), between environmental commitment and its main antecedents (proposed by TPB) (Hypotheses 2, 3, 4), and the effect of information on the antecedents of environmental commitment (Hypotheses 5, 6, 7). The study of the relationships between environmental commitment and its antecedents is based on some of the guidelines proposed by TPB.

Figure 6: Conceptual framework and principal variables



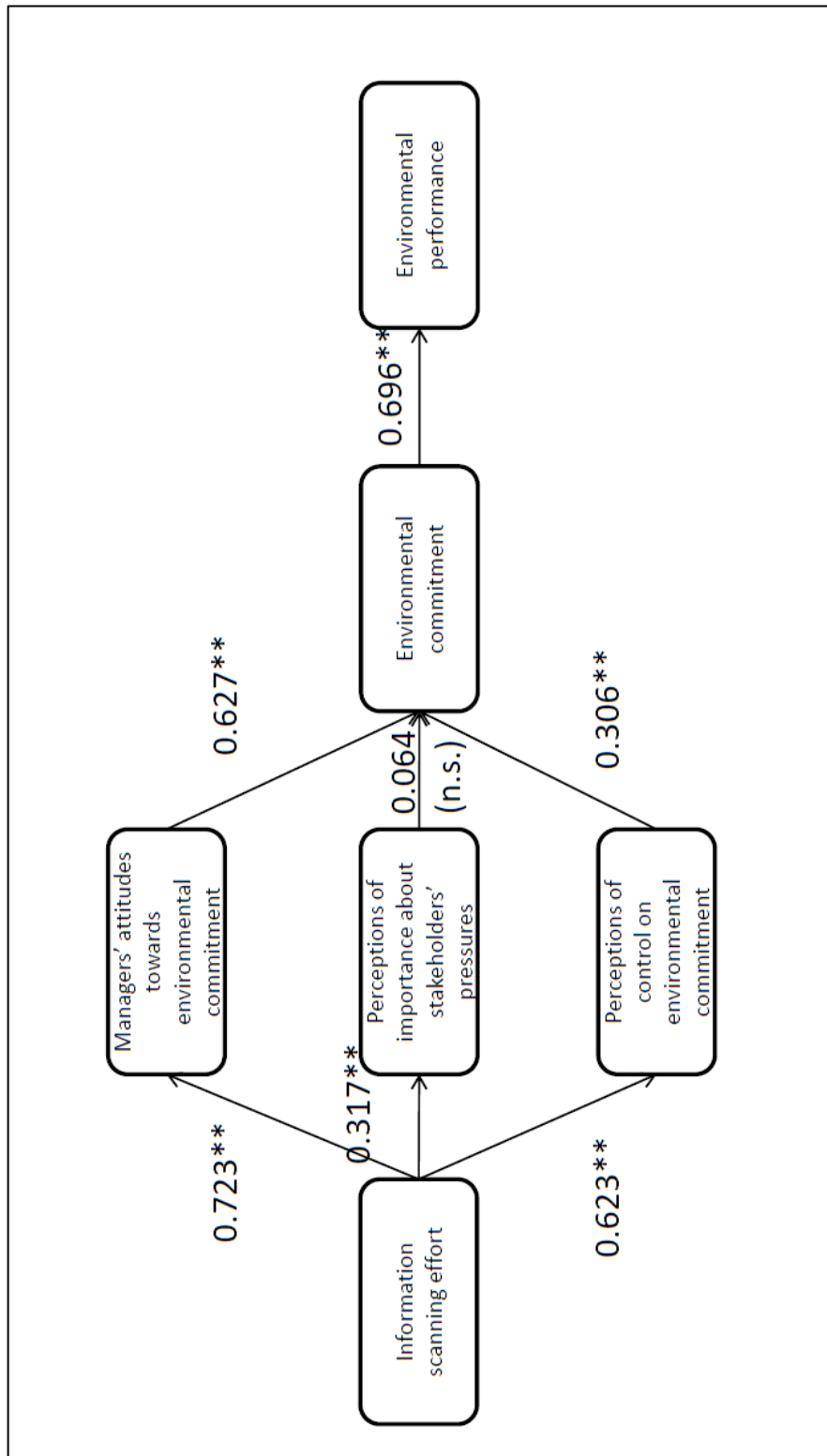
It is important to remember that the analysis of the structural model is the second step of the two-step SEM approach. This methodology ensures that results are valid and

obtained through the use of a model with a good factor structure that fits well (Tharenou et al., 2007).

4.7.1 Structural model

The structural model representing the research framework was developed in AMOS v.21.0.0. Information scanning effort is the only variable considered as exogenous, while the rest of the variables of the model are endogenous. The results obtained after running the model are presented in Figure 8.

Figure 7: Results obtained from the structural model, **p<0.01



The goodness-of-fit indices were found to be acceptable, supporting the robustness of the model. The values are as follows:

- $\chi^2/df = 1.615$ (the ideal is below 3)
- CFI = 0.906 (it should be the same or above 0.9)
- RMSEA = 0.058 (it should be below 0.1)
- IFI = 0.905 (it should be same or above 0.9)

All the relationships studied in this model were found to be statistically significant ($p < 0.01$), except for the relationship between environmental commitment and one of its antecedents, the perception of importance of stakeholder pressure. The addition of control variables described in Chapter 2 (the tonnage of grapes crushed during the year 2011 and the number of employees present in the winery) did not affect significantly the results obtained by the model.

In the case of Hypothesis 1, the relationship between environmental commitment and environmental performance, it can be seen that this relationship is strong (with a regression coefficient of 0.696 ($p < 0.01$)). This suggests that the adoption of an environmental commitment (and all the environmental practices and strategies associated) plays an important role in the improvement of the environmental performance of the Australian wineries.

Hypotheses 2, 3 and 4, which are related to the relationships between environmental commitment and its drivers (as proposed by TPB), differ in their results. Hypothesis 2, which predicts that the relationship between the attitudes of the management team towards environmental commitment will affect the extent to which their organisations adopt a level of environmental commitment, is supported (0.627, $p < 0.01$). This indicates shows that attitudes of the management teams may be important in encouraging change in the organisational practices related to environmental behaviour and for predicting the organisational behaviour in these areas. Hypothesis 3, which predicts that the

relationship between the perceptions of the management team about stakeholders' pressures and environmental commitment is positive, is not supported (coefficient of 0.064, $p > 0.05$). This result is in a way surprising, given the number of studies in the environmental management literature supporting a positive relationship. This finding will be discussed in more detail in the next chapter. Hypothesis 4 predicts that the perceptions of control of the management team about environmental issues is positively related to the level of environmental commitment adopted by the organisation, and this is supported by the results (0.306, $p < 0.01$), suggesting that issues related to perceptions of control, such as the perceived levels of skill and resources needed to engage with environmental issues, affect the extent to which organisations commit to the environment.

Hypotheses 5, 6 and 7 are based on the relationship between information scanning and the drivers of environmental commitment proposed by TPB. Hypothesis 5 predicts that the level of information scanning performed by the management team is positively related to the attitudes of the management team towards environmental commitment, which is supported by the results (0.723, $p < 0.01$). Hypothesis 6 states that information scanning is positively related to the perceptions of the management team about stakeholders' pressures, which is also supported by the results (0.317, $p < 0.01$). Finally, Hypothesis 7 predicts a positive relationship between information scanning and the perceptions of control of the management team about environmental issues, and is also supported by the results (0.623, $p < 0.01$). These findings reaffirm the importance for the management team of searching for information about environmental issues at the time of shaping their perceptions towards environmental commitment.

4.8 Summary

This chapter describes, first, firmographic characteristics of the sample, such as winery location, sales, number of employees and other. Data screening was also undertaken, in order to ensure that the data were suitable for analysis using multivariate techniques. Six constructs with 33 items in total were originally considered for this study, but after performing CFA it was necessary to restructure the construct of 'stakeholders', since the model was presenting problems with some indices of fit. After removing problematic items, the model fit improved and was suitable for analysis using SEM. The six constructs have strong internal reliability, exceeding the threshold of 0.7. All the variables were subjected to the assessment of homoscedasticity, linearity, normality, outliers and missing data, resulting in their being successfully evaluated.

After analysing the structural model using SEM, it was found that all the Hypotheses presented in this research were supported, excepting Hypothesis 3, predicting a positive relationship between managers' perceptions about stakeholders' pressures and the level of environmental commitment adopted by the winery. A further analysis of these results is conducted in the next chapter of this thesis.

Chapter 5

5 Discussion of Findings

5.1 Introduction

The objective of this chapter is to discuss the research findings presented in the previous chapter. Recapitulating, the main objective of this research is to identify and understand the reasons explaining the differences found in the levels of adoption of environmental commitment in organisations. In addition, this study examines the relationship between environmental commitment and environmental performance, and the effect of information scanning performed by managers on their perceptions towards environmental issues. In order to address these themes, seven hypotheses were developed, described in Chapter 2. This study also collected data using a survey of a sample of 184 Australian wineries. These data were later analysed using Structural Equation Modelling (SEM), as described in Chapter 5. In this section, the results obtained by this analysis will be interpreted and discussed.

The analysis of the hypotheses was grouped in three main areas: the relationship between environmental commitment and environmental performance, the relationship between managers' perceptions and environmental commitment, and the relationship between information scanning and managers' perceptions. The findings obtained by this research will also be compared with prior research conducted in other areas, in order to determine the extent of similarity between the findings obtained for the Australian wine industry and for other industries.

5.2 Results of hypotheses testing

5.2.1 The relationship between environmental commitment and environmental performance (H1)

Hypothesis 1 examines the extent to which the organisational adoption of environmental commitment, in terms of environmental practices, policies and strategies, improves environmental performance results in the Australian wine industry. The results of the structural model strongly support this Hypothesis, since the path coefficient obtained for the relationship between environmental commitment and environmental performance is 0.696 ($p < 0.01$).

The results are consistent with other studies in the environmental management literature, such as Annandale et al. (2004) and Lopez-Gamero et al. (2009), which found a strong association between environmental commitment and environmental performance in both manufacturing and service industries. These studies have claimed that increments of environmental commitment in organisations lead to the adoption of practices, technologies and processes oriented to preventing and diminishing pollution during production and the use of cleaner inputs that decrease damage to the environment. As a result, air, water and soil pollution will decrease, improving at the same time the respective environmental performance indices. In addition, the adoption of high levels of environmental commitment can also lead to increments in the levels of production efficiency (Young, 1991; Schmidheiny, 1992; Link and Naveh, 2006; Lopez-Gamero et al., 2009), allowing the organisation to produce the same amount of items but consuming fewer resources (raw materials, energy, water). This is caused by the adoption of practices and strategies that decrease waste generation and increase recycling rates. Given that levels of pollution are usually related to the amount of inputs used, fewer inputs will mean that organisations pollute less in their productive processes, improving their environmental performance results (Lopez-Gamero et al., 2009).

The results of this study highlight the importance for organisations of simultaneously adopting environmental practices in different areas in order to achieve better levels in environmental performance. As discussed in Chapter 2, higher levels of environmental commitment are related to the adoption of a larger number of more sophisticated practices, and this can affect environmental performance in synergistic ways. Improvements in environmental commitment involve the adoption of practices focused on operational aspects, such as recycling, reusability of raw materials, remanufacturing and pollution control, which can have an important effect on environmental performance (Melnyk et al, 2003; Gonzalez-Benito and Gonzalez-Benito, 2006). In addition, environmental commitment also considers the implementation of practices related to supporting activities, such as planning, control and communication of environmental initiatives (Gonzalez-Benito and Gonzalez-Benito, 2006), forcing managers to pay attention to their organisational processes, establishing mechanisms that allow the organisation to move forward in a rational and coordinated way and increasing managerial awareness about environmental problems and possible ways of addressing them. The simultaneous adoption of environmental practices in the areas of operation, planning and communication, allows the organisation to achieve long-term improvements in decreasing pollution and improving also operational features through efficiency increases and waste reduction (Sharma, 2000; Melnyk et al., 2003; Gonzalez-Benito and Gonzalez-Benito, 2006).

Given that results show that the effect of environmental commitment on environmental performance is strong, it is of great importance for theory and practitioners to be able to explain and understand the drivers of environmental commitment. As explained in Chapter 2, TPB proposes some elements that can have an effect on environmental commitment, and this effect is discussed in the next sections of this chapter.

5.2.1 To what extent do the perceptions of management teams on environmental issues affect the adoption of environmental commitment in organisations? (H2, H3 and H4)

Hypotheses 2, 3 and 4 relate to the role of managers' perceptions in driving the adoption of environmental commitment within organisations. These Hypotheses follow the framework of TPB, which state that the three most important drivers of behaviours (such as the adoption of an environmental commitment) are attitudes, perceived norms and perceptions of control. Therefore this section discusses and interprets the results obtained for the relationships between these three drivers and environmental commitment.

Hypothesis 2

Results found in the structural model support strongly this Hypothesis (coefficient = 0.627; $p < 0.01$). This means that management teams that have positive attitudes towards environmental commitment, seeing it in terms of opportunities, benefits and gains, and with positive expectations, will be likely to lead organisations which have adopted high levels of environmental commitment. This result is consistent with the findings obtained by studies such as Cordano and Frieze (2000), Sharma (2000), Rivera-Camino (2012) and Papagiannakis and Lioukas (2012), which found similar relationships (coefficients between 0.3 and 0.5).

The results of this research confirm the statement proposed by TPB that the values and perceptions (attitudes) held by individuals towards a certain behaviour, have a strong predictive value on the performance of that behaviour (Fishbein and Ajzen, 2010). Traditionally, environmental management literature has emphasised the importance of external factors and organisational characteristics, such as the position of the organisation in the supply chain, the industrial sector or the geographical location (Gonzalez-Benito and Gonzalez-Benito, 2010) on the environmental commitment choice.

However, results for this Hypothesis suggest that variables that usually are considered to be more subtle, such as the feelings, perceptions and attitudes of management teams, can also make an important difference in this matter, highlighting the importance that factors that come from the human dimension have on organisational outcomes. These results are aligned with the findings of studies based on the New Zealand wine industry, such as Gabzdylova et al. (2009) and Dodds et al. (2013), which state that for wineries' managers the most important reasons to commit to the environment are intrinsically personal reasons, such as environmental values, social concern and personal satisfaction with the profession, elements that come from personal and internal sources.

The results obtained also suggest that managers' belief that benefits and gains can be achieved as a result of adopting a commitment to the environment, can increase optimism and boost managers' environmental attitudes. Benefits caused by high levels of environmental commitment, such as positive changes in the image of the organisation (which can influence positively customers' perceptions towards the organisation), or economic savings due to the implementation of energy, water and recycling programs (Inman, 2002; Silverman et al., 2005) are likely to improve attitudes, enticing managers to adopt more and better environmental practices. As result of these positive attitudes, managers will support and encourage collaboration between groups to facilitate the development of environmental initiatives, committing resources and capital with the objective of bringing these ideas to fruition (Hunt and Auster, 1990; Gonzalez-Benito and Gonzalez-Benito, 2006).

Hypothesis 3

Results do not support Hypothesis 3 (coefficient = 0.064; $p > 0.05$). This finding is different from prior environmental management research that considers the role of organisational stakeholders as vital in the achievement of strategic goals such as environmental commitment (Henriques and Sadorsky, 1999; Buysse and Verbeke, 2003; Gonzalez-Benito and Gonzalez-Benito, 2006; Garvare and Johansson, 2010; Sarkis et al., 2010).

A first plausible explanation for this result can be proposed by comparing the Australian wine industry against other industries. Prior research on stakeholders' pressures and environmental commitment has been conducted in industries such as the chemical, energy and forestry industries, which traditionally have been recognised as having a large environmental impact (Henriques and Sadorsky, 1998; Sharma, 2000; Buysse and Verbeke, 2003). Consequently, these industries are usually monitored closely by authorities and other stakeholders, including communities and environmental groups, and this causes management teams to perceive stakeholders' pressures as very relevant. Although producing a large degree of environmental damage through fertilisers, water depletion and others, the wine industry has not received the same level of pressure from regulatory agents or public opinion (Gabzdylova et al., 2009), and this can explain why stakeholders are not perceived as relevant in the industry.

A second explanation for the apparent lack of influence of stakeholders' pressures in the Australian wineries, could be that this influence is real but that managers are not aware of its effect. Literature about normative social influence states that actions and opinions of other people (such as stakeholders) can significantly affect behaviour (Schultz et al., 2007; Nolan et al., 2008; Fishbein and Ajzen, 2010; Allcott, 2011), but this effect is not always recognised as such by individuals (Nolan et al., 2008). Studies have confirmed that during self-reporting individuals tend to give much more importance to their own attitudes and ideas, leading them to provide answer such as, for example, protecting the

environment because “it is the right thing to do”, or “it ensures the children’s future”, but they are less likely to accept or believe that their actions are influenced by knowing the other’s actions and opinions, even though it has been ascertained that these factors do have an important effect (Malle, 1999; Nolan et al., 2008). Therefore it might be that the tendency to consider the own opinions and attitudes as more important, can explain in part why stakeholders’ pressures are not considered highly relevant by wineries’ management teams, under-estimating their stakeholders’ real role. This could also explain the reason why managers’ attitudes, in Hypothesis 1, were shown to be an important predictor of environmental commitment, in contrast to Hypothesis 3.

Hypothesis 4

Hypothesis 4 was supported, since results show that the relationship between perceptions of control about environmental issues and the adoption of environmental commitment has a moderate strength and it is statistically significant (0.306 at $p < 0.01$). This result suggests that the perceptions of control held by management teams about their organisational capabilities are factors that tend to act as facilitators or inhibitors of the process of adoption of environmental commitment in wineries, which is supported by the behavioural literature (Bandura, 1986). As a consequence, when managers feel that their team has control over environmental issues, in the sense of having the right skills, resources and mastery to engage with new environmental practices or to improve existing ones, their organisation is more likely to adopt a stronger commitment to the environment than when managers feel environmental issues are out of the control of the management team. In addition, managers might be more willing to take more risks and actions conducive to achieving their environmental goals, since more control usually helps to reduce levels of anxiety and uncertainty (Anderson & Bateman, 2000). These results support the strong relationships found by previous studies between managers’

perceptions of control and the willingness of organisations to adopt environmental practices (Armitage and Conner, 2001; Papagiannakis and Lioukas, 2012; Rivera-Camino, 2012) that have been developed in different industries such as chemicals, food, metals and textiles. The coefficient found in the present research is similar to those in other studies, which range between 0.2 and 0.6 (Papagiannakis and Lioukas, 2012; Rivera-Camino, 2012).

The results of this study also suggest that management teams in Australian wineries that feel constrained in their ability to make environmental commitment consider that their level of control over the environmental choice to be adopted is low, which increases the likelihood for the organisation of just adopting low levels of environmental commitment. This is consistent with the findings of Jackson and Dutton (1988), which explains this behaviour by arguing that management teams consider that choices involving low levels of control will involve higher risks and the likelihood of incurring losses, and, therefore, they prefer to adopt a more defensive position, refraining from moving forward in this area. On the other hand, management teams that feel free to choose the levels to which they commit to the environment will tend to increase their perceptions of control, minimising uncertainty about positive environmental results and improving their hope of obtaining good results for the organisation.

From the results of H2, H3 and H4, it can be noted that the drivers of behaviour proposed by TPB are not equally important for predicting the levels of environmental commitment adopted by the sample of Australian wineries used in this study. The attitudes held by management teams towards environmental commitment and their perceptions of control on this issue are more predictive of environmental commitment by management teams than pressures received from their stakeholders (perceived norms). This supports the findings of Gabzdylova et al. (2009), which argue that, for wineries located in New Zealand (located geographically close to the Australian wine industry), personal preferences and environmental values of management teams are stronger drivers of

environmental commitment than the pressures received from their stakeholders, since traditionally important stakeholders, such as government and regulations, are not perceived as difficult to satisfy. This is different to those wine industries located in other parts of the world (such as in the USA). Cordano et al. (2010) found that for wineries in the USA, perceived norms (stakeholders' pressures) were considered to have a much deeper effect on managers' decisions about environmental commitment; these norms or pressures included actors such as environmental activists and community stakeholders, who were very relevant at the time of defining environmental strategies in wineries. The importance of these stakeholders has allowed them to see their requests included in industrial codes of sustainability (Cordano et al., 2010).

5.2.2 How does information scanning affect the adoption of environmental commitment in organisations? (H5, H6 and H7)

Hypotheses 5, 6 and 7 aim to predict the effect of information scanning on the attitudes towards environmental commitment held by the management team, on their perceptions about stakeholders' pressures and on their perceptions of control on environmental commitment. These Hypotheses are based on the idea that higher levels of information scanning about the natural environment can positively affect and change managers' perceptions about strategic issues, particularly in environmental areas (Kaiser and Shimoda, 1999; Maheran et al., 2009).

Hypothesis 5

The relationship between the information scanning effort performed by the management team and their attitudes towards environmental commitment was found to be positive and strong (0.723 at $p < 0.01$), thus supporting Hypothesis 5. These results suggest that the

information collected and analysed by managers positively affects their attitudes and their perceptions about environmental commitment in terms of gains and benefits, reducing their levels of ambiguity, uncertainty and anxiety (Thomas et al., 1993; Sharma, 2000; Armitage and Conner, 2001).

Overall, results show that management teams that follow certain pre-established patterns when scanning for information tend to perceive environmental issues as opportunities and in positive terms. According to the results, factors such as being able to scan for information in a regular basis, the fact of relying on pre-structured methods and also the deliberate desire and willingness of performing this scanning effectively improve the environmental attitudes of management teams, which corroborates the theoretical arguments of Jain (1984), El Sawy (1985) and Maheran et al. (2009). These practices distinguish managers who are exposed passively to information from those who are actively looking for new raw material on which to base their interpretations. These latter managers show an evident interest and a genuine intention of learning, revealing that they believe that benefits can be obtained from this knowledge (Sharma, 2000), or, in other words, they show their positive attitude towards environmental issues.

Results also support the underlying effects of larger volumes of information and knowledge on attitudes. As discussed in Chapter 2, the literature has claimed that sophisticated ways of scanning produce larger amounts of information that tends to be more detailed and accurate, since scanning efforts are better concentrated and focused (El Sawy, 1985; Maheran et al., 2009). Some studies, such as Arcury (1990) and Barr (2007), have argued that these larger amounts of information can be translated as valuable knowledge for managers once the right procedures of analysis have been performed. This knowledge can affect positively the attitudes of managers towards the areas of interest (Arcury, 1990; Barr, 2007), since understanding is improved and uncertainty is reduced. The results of this research are aligned with these statements,

since they show that managers who invest time in analysing and understanding the information collected tend to show more positive attitudes towards the environment.

As an example of the way that these scanning practices, and the knowledge obtained through them, can positively affect the attitudes of managers, an insight provided by one winery manager in the Yarra Valley region (Victoria) during the pilot study is presented here. The manager stated that information for him was one of the most useful resources when making environmental decisions. He subscribed to a number of magazines related to grape growing and winemaking, and, in one of these volumes in particular, he recalled having read about the benefits of underground drip lines in vineyards and the way this system was implemented in wineries in Saudi Arabia, where, like Australia, water tends to be a scarce resource. According to this manager, this information made him consider this environmental technology in more positive terms, improving his attitude towards these practices. Given that the Yarra Valley region is affected frequently by drought, the manager decided to incorporate this system into his vineyard, which allowed him to decrease the amount of water consumption, to deliver the right amount of nutrients and to save money at the same time. This example shows the way that information can effectively improve managers' attitudes towards solutions that are both economically feasible and environmentally safe.

Hypothesis 6

Hypothesis 6 was also supported by the analysis of the research model, stating that high levels of information scanning were found to be positively related to the management team's perceptions of stakeholder's pressures (path coefficient of 0.317 at $p < 0.01$). This result suggests that the information that managers are able to scan about environmental care, along with increasing their knowledge in this area, might also increase their awareness about what their stakeholders require. When managers collect, analyse and

include into their strategies information about environmental care, they are also implicitly increasing their knowledge about their stakeholders and their requirements, given that environmental stakeholders' pressures are an integral part of environmental care (Gonzalez-Benito and Gonzalez-Benito, 2010). As the information scanning process becomes more sophisticated in the organisation, management teams tend to include new information sources, involving their stakeholders, since these are important agents who are able to provide accurate and up-to-date information about the environmental behaviour followed by the organisation (Daft and Weick, 1983; Daft and Weick, 1984; Choo, 2001). Therefore when managers make environmental decisions based on the scanned information, these decisions are also including and considering stakeholders' pressures, which results in an increment in the stakeholders' perceived importance.

In addition, the result obtained is aligned with the findings of authors such as Craig-Lees (2001), Nyjhof et al. (2006) and Morsing and Schultz (2006), which argue that strategic issues in organisations (such as environmental commitment) must be determined while having a comprehensive knowledge about organisational stakeholders, which would increase their perceived importance. As a consequence, managers must be aware about information channels used by stakeholders to submit their demands. In the case of stakeholders such as customers, they have been identified in several studies as one of the most important groups of pressures (Henriques and Sadorsky, 1998; Gabzdylova et al., 2009), and their requests, demands and opinions about wine and environmental care are in fact an important area where managers are focussing their scanning efforts. The main source of information about customers' preferences for wineries is the level of demand for their products. Other stakeholders can express their requirements through other communication channels. Environmental groups, communities and public media can influence the organisation and other stakeholders through radio, TV and newspapers, meaning that information scanning is also used as a tool for improving organisational intelligence, and learning about new conditions demanded by these groups that must be satisfied in order to keep the organisation working. Results suggest that wineries able to

keep the focus of their scanning efforts on their important stakeholders and their channels will have a more holistic perception of their customers' preferences, and thus will be more likely to take measures to match these preferences, increasing customers' relative importance.

Hypothesis 7

The relationship stated by Hypothesis 7 between information scanning efforts performed by management teams and their perceptions of control of environmental commitment was also found to be strongly positive, with a path coefficient of 0.623 at $p < 0.01$. This result supports the notion that information scanning is an important component for management teams in their process of building confidence and certainty about how to implement environmental commitment, thereby increasing their perceptions of control about undertaking environmental commitment. These findings corroborate the conclusions of studies in industries such as hotels and mining, where it is stated that information "about environmental standards, practices, regulations, technologies and societal expectations provides managers with the capacity to undertake (improved) environmental practices" (Sharma, 2009, p. 269).

Perceptions of control may affect management teams in two different aspects (Bandura, 1993). The first is related to the level of personal confidence and self-efficacy held by the members of the management team about internal organisational factors such as capabilities, skills and resources. In this case, the results obtained for H7 imply that information scanning may increase and reaffirm perceptions of control over these areas, supporting the development of awareness and positive attitudes about the skills and resources owned by the organisation. In this sense, wineries' management teams could see their perceptions of control improved when they use information to learn about processes and techniques in wine making and environmental care, or when information is

used to support the process of decision making regarding technology acquisition and environmental budgets (Marshall et al., 2005).

Secondly, it is also important to analyse the perceptions of control held by the management team towards external conditions related to the environment, and the extent to which these conditions represent problems or opportunities to the winery. These conditions for wineries can be, for example, environmental regulations, the natural conditions of the organisational surroundings (availability of water, energy), geographic location of the organisation or the proximity of communities. Results show that improvements in the process of information scanning will also be likely to affect positively the perceptions of control of management teams about their organisational surroundings and the extent to which they think these external conditions can be modified to the benefit of the winery. Additionally, the process of information scanning is useful to managers for understanding how to link opportunities with the right organisational capabilities, increasing in this way their perceptions of control (Thomas et al., 1993). In practical terms, for wineries this means that, through information, management teams will be able to learn and to appreciate the benefits of being involved in processes such as recycling of supplies (bottles, cardboards, corks, water), waste management and energy saving programs. Therefore, along with increasing their perceptions of control, management teams with higher levels of information scanning may set higher environmental goals for their organisation, since they will feel more confident and more motivated, putting in much more effort to master the challenges (Sharma, 2000).

Overall, results show that, although information scanning has a significant impact on the drivers of environmental commitment (attitudes, perceptions about stakeholders and perceptions of control), as measured in the sample of Australian wineries, this impact is larger on managers' attitudes and their perceptions of control. The fact that the relationships between information scanning and managers' attitudes and perceptions of

control about environmental commitment are stronger than for the case between information scanning and perceptions about stakeholders' pressures reinforces the claims made by some studies that argue that the elements that are part of the personality of individuals tend to be more important for committing to the environment (Gabzdylova et al., 2009). This may suggest that information is used by managers to a larger extent to define and support managers' own attitudes and perceptions rather than to be informed about external requirements from stakeholders, since, as explained earlier, previous results of this study indicate that external pressures are not perceived as a threat by Australian wineries.

5.2.3 Theoretical implications and contributions

The current study has applied the theory of planned behaviour (TPB), one of the most widely accepted theories from the behavioural literature, to describe and understand the reasons that lead managers in Australian wineries to commit to the environment. The theory of planned behaviour has been used extensively to describe the way that behaviours are shaped in individuals through the analysis of drivers such as attitudes, perceived norms (stakeholder's pressures) and perceptions of control (Fishbein and Ajzen, 2010). Based on this theory, the present research has contributed in the following ways.

First, this research confirms the applicability of TPB to organisations, lending support to a small but growing body of literature in this area (e.g., Cordano and Frieze, 2000; Papagiannakis and Lioukas, 2012; Rivera-Camino, 2012). The current study researched the elements of attitudes, stakeholder's pressures and perceptions of control (described by TPB) within the same sample of organisations, comparing the impacts of each of these drivers on the level of adoption of environmental commitment in Australian wineries. The

results of this study show that attitudes and perceptions of control held by management teams, which are factors based on preferences and capabilities that are internal to the organisation, are stronger predictors of environmental commitment. Although perceptions about elements that are mostly external to the organisation, such as stakeholder's pressures, seem to be ineffective factors in the prediction of the level of organisational commitment, this could be produced by the conditions currently present in the Australian wine industry (where regulations apparently are not perceived as a threat), and this could be different in other industries.

Second, this research contributes to the extension of the focus of TPB, presenting in one single framework the relationships between environmental commitment, its drivers (as proposed by TPB), the impact of information scanning on these drivers, and the effect of environmental commitment on organisational outcomes (particularly on environmental performance). The advantage of providing this complete picture is that it allows assessment of all these relationships under similar conditions, using the responses and criteria of the same sample of managers of Australian wineries, enabling the elaboration of more accurate conclusions.

Third, this study reaffirms the link between environmental commitment and environmental performance, stating that the adoption of a set of practices oriented to protecting the environment has a positive effect on reported environmental performance of the organisation, particularly in the Australian wine industry. Since several sectors of society push for improvements in organisational environmental performance, this result confirms the importance of studying the drivers of environmental commitment as elements that can truly have a deep effect on the improvement of environmental performance.

Fourth, this study reaffirms the importance that managers' perceptions have on the process of shaping organisational behaviours such as environmental commitment. Past

studies have highlighted the importance of other drivers of environmental commitment, such as regulations or economic factors (e.g., Henriques and Sadosky, 1999; Sharma, 2000; Buysse and Verbeke, 2003), and the effect of perceptions has been considered mostly when environmental behaviours were performed at the individual level (e.g., Flannery and May, 2000; Vasquez Brust and Liston-Heyes, 2010). The current study reaffirms the value of the human dimension for the achievement of organisational outcomes, showing that these perceptions can motivate the adoption of strategies that can greatly affect the way organisations work.

Fifth, this study reinforces the importance that information scanning has on shaping managers' perceptions. Results suggest that the strong relationship between information scanning and managers' attitudes and perceptions of control can affect managers' understanding of the consequences of adopting certain levels of environmental commitment, such that it is more likely that they will label and recognise this commitment in positive terms and benefits for the organisation, and see opportunities where other see threats. This thus validates studies such as Hambrick (1982), Thomas et al. (1993) and Sharma (2000).

5.2.4 Practical implications and contributions

This study proposes some implications for practitioners that are direct consequences from the results found. Since results suggest that managers' attitudes and perceptions of control are important drivers of environmental commitment, organisations interested in adopting higher levels of environmental commitment may wish to consider approaches that foster positive managerial attitudes and perceptions of control. One idea might be that, initially, management teams should appoint environmental measures that are environmentally effective, economically feasible and easy to implement, picking the "low-

hanging fruit” first (Cordano and Frieze, 2000). This strategy is focused on making the first investments in environmental projects with higher returns, and any benefit obtained from doing this would support the introduction of other environmental practices in the future. It allows, first, for the same management team to be convinced about the advantages of environmental projects, improving their own attitudes and perceptions of control towards these projects, and, additionally, the results obtained can be used as a tool to persuade other agents in the organisation towards higher levels of environmental commitment (Kotter, 1996; Cordano and Frieze, 2000).

For wineries, most of environmental problems come from energy consumption (cooling and refrigeration in the processes of fermentation and aging and compressing air in machinery), waste generation, water use and its disposal, and pollution through the use of pesticides, herbicides and fertilisers (Galitsky et al, 2005; Marshall et al., 2005; Gabzdylova et al., 2009). As a way of example, some practices that wineries in Australia have successfully adopted for addressing these problems and have had positive effects on attitudes are related to the insulation of fermenting tanks, bringing in cool air at night, or checking for leaks in compressed air hoses. These measures can be complemented by the replacement of light bulbs with technologies such as LED lights. These measures are easy and cheap to implement, and are able to generate savings that can improve the attitudes of managers towards environmental commitment in Australian wineries. Australian wineries should consider including in their environmental commitment solutions such as the use of drip line irrigation in vineyards to make the watering process more efficient, the adoption of equipment that is less intensive in water consumption during winemaking (at the stages when the vessels need to be washed) and improvement in the training of employees in these issues (Marshall et al., 2005; Gabzdylova et al., 2009). In regards to the third issue (pesticides, herbicides and fertilisers), wineries interested in improving their environmental performance should address this through the avoidance of artificial and harmful products, to change towards solutions such as organic compost. The results of this research suggest that the adoption of several practices

combined, such as the ones described, can increase the level of environmental performance of the winery.

In order to encourage the adoption of higher levels of environmental commitment, perceptions of control of the management teams must be boosted. Gist and Mitchell (1992) propose a mixed strategy for increasing these perceptions of control based on learning, training and information access. The first step in this strategy is to recognise that managers need to learn ways of identifying and assessing the capabilities of their organisation and the current environmental opportunities. In this sense, managers in organisations (and particularly in wineries) should undergo this learning through on-the-job training, peer mentoring, and seminars and workshops provided by the government or wine associations, complementing this with the assistance of environmental consultants. Second, in order to increase their level of awareness and understanding about the characteristics of the environmental tasks and measures to adopt, along with assessment of the level of effort involved, it is necessary to support the managers' abilities acquired during this learning through access to organisational information. With these steps, managers can make environmental decisions based on real and accurate perceptions about their organisation's capabilities, avoiding misconceptions that might be far from real.

The results of this research also suggest that information scanning can affect significantly the drivers of environmental commitment. Frequency of scanning gains importance in wine making, since there are certain areas, such as new machinery, new techniques in pruning, watering and canopy management, where innovation is produced fast (Giuliani and Bell, 2005). Therefore, there is a need of keeping the organisation up-to-date in these fields, which can be satisfied through frequent scanning of information. This would also help shaping managers' attitudes and perceptions towards these areas. Results also suggest that wineries should consider increasing their knowledge and information about factors that can mean an opportunity or a problem for the organisation, enhancing or

decreasing managers' perceptions of control. These conditions for wineries can be, for example, environmental regulations, the natural conditions of the organisational surroundings (availability of water, energy), geographic location of the organisation or the proximity of communities.

Chapter 6

6 Conclusion

Environmental commitment in organisations is an issue that has been increasingly demanded to be addressed by many sectors across society. The environmental management literature has traditionally understood and explained the way in which environmental commitment is adopted in organisations using the stakeholder theory, based on the concept that certain agents, such as consumers, governments or citizens push for environmental improvements, and this results in organisations' being forced to improve their environmental behaviour in order to survive in the market. Although factors related to regulations, economy and social pressures are recognised as drivers of environmental commitment (Henriques and Sadorsky, 1998; Buysse and Verbeke, 2003), there are also organisational psychological factors that can play an important role in the adoption of environmental commitment in organisations, such as the perceptions of management teams about environmental issues. This research has studied the effect of these perceptions on organisational behaviours, specifically on environmental commitment, using TPB as guidance. This research proposes that the attitudes of the management teams towards environmental commitment, their perceptions of stakeholders' pressures and their perceptions of control on environmental issues will be important predictors of the level of adoption of an environmental commitment in organisations.

One of the main motivations of this research is to understand the reason why there are organisations that prefer to adopt higher levels of environmental commitment, addressing and correcting a wider range of environmental deficiencies, whereas other organisations remain at lower levels, responding to a reduced number of environmental challenges and in a less intense manner. Once the drivers of environmental commitment

in organisations have been identified, they may be used by managers to understand ways of improving the environmental commitment in their organisations, and also by agents such as regulatory institutions for assisting, supporting and orienting organisations in their quest for achieving better levels of environmental commitment.

In order to respond to this question, data were collected from a sample of 184 Australian wineries located all over the country, using an online survey. Hypothesis 1, which addresses the relationship between environmental commitment and one of the organisational outcomes, environmental performance, was fully supported by the data, meaning that Australian wineries with high levels of environmental commitment also have better environmental performance. The result for this Hypothesis reaffirms the importance of studying the drivers of environmental commitment as a way of understanding how environmental performance can be improved.

The results for Hypotheses 2, 3 and 4 showed that, of the three elements of perception proposed by TPB as predictors of behaviours (attitudes of the management teams towards environmental commitment, their perceptions of stakeholders' pressures and their perceptions of control on environmental issues), attitudes and perceptions of control are the stronger predictors of environmental commitment. These findings thus reinforce the conclusions of previous studies, where it is stated that drivers that come from the same individuals, such as attitudes and perceptions of control, are the stronger drivers of environmental commitment in wineries (Gabzdylova et al., 2009). These two drivers are elements capable of explaining partially the differences in the adoption of environmental commitment in different organisations. Stakeholders' pressures were found to be less predictive than attitudes and perceptions of control for Australian wineries, showing that wineries' managers do not feel large pressures from their stakeholders. These findings show that, for management teams, internal factors, such as their own appreciation about environmental commitment and their perceptions about their organisational capabilities, skills and resources, appear to assume greater

importance than external factors such as stakeholders' pressures when considering the level of environmental commitment.

The last group of hypotheses (H5, H6 and H7) addressed the role of information scanning on the perceptions of the management team. The role of information scanning and the amount of information available for managers were found to be predictive of their perceptions about environmental commitment. The importance of these elements has been highlighted by other studies, summarised thus: "the key to success in pollution prevention is to influence managerial knowledge of and managerial attitudes toward both technological change and environmental concerns" (Ashford, 1993, p. 277). Information can support management teams when used, for example, to improve understanding about new environmental practices and policies, and also about the resources, time, skills and technologies involved in the undertaking of environmental projects.

Overall, the main results of this research are as follows. First, this study reaffirms the positive relationship between environmental commitment and environmental performance, which increases the importance of understanding the drivers of environmental commitment. Second, this study increases the level of awareness about the impact that perceptions that come from management teams have on the process of shaping of organisational behaviours such as environmental commitment. This contrasts with past studies in the sense that these have mostly considered external factors, such as stakeholders' pressures, as drivers of individual behaviours (e.g. Henriques and Sadorsky, 1998, Murillo-Luna et al, 2008). Third, this study analysed the three drivers of environmental commitment related to managers' perceptions at the same time, comparing their effects within the same study. This is in contrast to previous studies that have performed research on these elements individually and separately. This simultaneous analysis allowed the researcher to conclude that attitudes and perceptions of control, which are internal factors, are the most relevant drivers of environmental

commitment, whereas the element of stakeholders' pressures is less relevant for managers. Fourth, this study contributes to highlighting and reinforcing the importance that information scanning has on the shaping of attitudes, perceptions about stakeholders' pressures and perceptions of control, since it is likely to influence management teams in conceiving environmental commitment in terms of opportunities for the organisation. All this was developed by studying the Australian wine industry, which is a good example of an industry that wishes to project an environmentally conscious image, but one that also struggles greatly with issues such as herbicides, pesticides and water management.

From the managerial point of view, some of the contributions of this study are as follows. First, given that perceptions of management teams are an important element at the time of adopting an environmental commitment, the organisation must put effort into improving these perceptions, investing in environmental capabilities (clean technologies, production methods), skills of employees in environmental issues and the allocation of resources for this kind of project. Additionally, the assistance of environmental consultants can be of help at the time of assessing the organisation's capabilities. These points can positively influence the perceptions of management teams in identifying environmental commitment as something controllable, doable and positive for the organisation. Second, since information scanning is an element that can have positive effects on the drivers of environmental commitment, the results of this study suggest that the improvement of the practices oriented to collecting and analysing information gains increasing importance for organisations struggling with environmental problems and with low levels of commitment. In this sense, some of the practices to adopt are related to the determination of clear objectives, the inclusion of varied information sources and the establishment of special areas in the organisation that are to be in charge of collecting and analysing this information. Moreover, this study also proposes a framework to conceptualise and measure the practices and indices involved in environmental commitment and environmental performance in wineries. In the literature

there are many ways of measuring these concepts, but most are not specific and lack some important concepts that are present in wineries, such as the inclusion of elements related to herbicides or water management. Additionally, these measurements were refined by the comments and suggestions of the wineries' managers and the institutions included in the pilot study for this research.

6.1 Limitations and future research directions

This study has limitations that arise from the methodology used. First, the design of this study (cross-sectional) is a single examination of the variables that are the object of this investigation at a certain moment in time. Some of these variables, such as environmental commitment, are complex in nature and multiple observations over time may define these variables in a more precise way. In addition, although this research found evidence about, for example, managers' attitudes influence the level of environmental commitment adopted by the organisation, the opposite also could be possible, that is, that organisations with high levels of environmental commitment have incorporated this into their organisational culture, influencing the attitudes and perceptions of managers. Multiple observations may settle this discussion, since it would be possible to examine the effect of some variables on others over time. However, this process is expensive and very time-consuming, and would also be reliant on managers' commitment to the research, since they have to be assessed on multiple occasions. This may be a future direction for other studies.

Second, since one of the strengths of this work is to elaborate general conclusions that can be generalizable in the Australian wine industry, these conclusions might not be generalizable beyond this industry. Managers' perceptions can vary greatly, depending on geographical location, cultural context or regulation (Chiu et al., 2010), and this could introduce difficulties into extrapolating the conclusions to other industries. In order to obtain entirely generalizable conclusions, it would be necessary to perform a replication

of this study oriented to comparing managers' perceptions about environmental commitment under different scenarios (that is, in other industries and in other countries). This would be also interesting for understanding the way in which external factors such as culture and regulations affect an individual's perceptions.

6.2 General conclusion

The objective of this research was to corroborate the existence of a positive link between environmental commitment and environmental performance, which entails the need of address the drivers that lead to higher levels of environmental commitment in organisations.

After examining the drivers that TPB proposes as those likely to impact behaviours such as environmental commitment in organisations, results show that there are strong relationships between drivers that come directly from managers' perceptions and the levels of environmental commitment that organisations have adopted. Although no causal relationships can be inferred from these results, they provide evidence that positive attitudes towards environmental commitment and perceptions of control about this commitment are important factors to consider at the time of assessing the level of environmental commitment that an organisation can achieve.

One result that it is worth revisiting and was not expected in this research was the relatively low impact that environmental stakeholders have on the level of environmental commitment of the Australian wineries, in the sense that these pressures are less critical in comparison with managers' attitudes and their perceptions of control about environmental issues. Although stakeholders' pressures have proved to be an important driver of environmental commitment in studies focused on other industries such as mining, forestry or energy, the Australian wine industry seems to be less affected by these pressures. This might be caused by the social belief that the Australian wine industry does not produce an impact on the environment, since traditionally this industry

is composed of small and medium organisations, and it has tried to present itself as “green” and environmentally conscious. This belief could make stakeholders to refrain posing environmental pressures in organisations. However, this industry do have a large impact on the environment, through the use of chemical pollutants (herbicides and pesticides), water depletion and issues such as recycling and waste management.

This study also provides evidence that information scanning in organisations is closely related to managers’ attitudes and perceptions of control, suggesting that information about environmental issues, practices and way of adopting them in the organisation, along with the way this information is scanned by managers, may be factors that are required for managers to shape their perceptions about environmental issues.

High levels of environmental commitment are an organisational attribute that is desired by society and the results obtained by this research show the way these levels can be increased, by boosting managers’ attitudes and their perceptions of control. Implications of these findings are, for example, to start implementing environmental practices that do not involve many expenses, in order to collect benefits that have a positive impact in their attitude and in the organisation as a whole. This would lead to a “virtuous circle”, since positive changes in attitudes can lead to the adoption of higher levels of environmental commitment through the incorporation of a larger number of more sophisticated environmental practices in the organisation. Regarding perceptions of control, managers should aim, first, to formally assess the organisational capabilities required to commit to the environment, and second, to find ways of improving these capabilities if they are considered to be inadequate. In this way, managers would see their perceptions of control increased at the time of dealing with environmental issues.

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Appendix 1: Introduction letter

Dear [INSERT NAME]:

We are researchers in the Department of Management at Monash University and are conducting a study regarding environmental commitment in a sample of Australian wineries.

Our project, called “Effects of managerial perceptions on the organizational environmental commitment: a behavioral approach” seeks to research the way wineries’ managers scan for environmental information and the way this information can affect organisational behaviours such as making an environmental commitment.

Your winery’s contact information was obtained through the “Wine Industry Directory”, and at this stage, we would like to invite you to take part in this research filling in a short survey that will allow us to identify the environmental situation of your winery in relation to the industry. In return for your kindness, you will be able to access a free summary of the results of our study via email, on request.

In order to fill in the survey, please enter to the following web address: [link of the survey]. You will not take more than 10 minutes in answering. Your insight will be invaluable to our research project. Should you require more information about the project, please contact the researcher.

Important: This research will lead to a thesis of a PhD at Business and Economics at Monash University and the information collected in this way will be kept confidential for a period of 5 years (after that it will be erased). The disclosure of information will be just in aggregate through academic journals, so no individual information could come to light. In addition, as we will not have a way to identify you as a respondent, after sending your data it will not be possible to withdraw from this research. If you have any complaint concerning the manner in which this research is being conducted, please contact:

Executive Officer
Monash University Human Research Ethics Committee (MUHREC)
Building 3e, Room 111
Research Office
Monash University VIC 3800

[REDACTED]
[REDACTED]
[REDACTED]

Number of project: CF11/3505 - 2011001864

Kindest regards,
Franz Carrillo – PhD student

[REDACTED]
[REDACTED]

Appendix 2: Survey

1.- Which Australian state is your winery located in?

	Australian Capital Territory	New South Wales	Northern Territory	Queensland	South Australia	Victoria	Tasmania	Western Australia
State								

2.- How many tonnes of grapes does your winery crush during a 12 months period?

	Less than 10 tonnes	Between 10 and 19 tonnes	Between 20 and 49 tonnes	Between 50 and 99 tonnes	Between 100 and 249 tonnes	Between 250 and 499 tonnes	Between 500 and 999 tonnes	Between 1,000 and 2,499 tonnes	Between 2,500 and 4,999 tonnes	Between 5,000 and 9,999 tonnes	Between 10,000 and 19,999 tonnes	Over 20,000 tonnes
Range of tonnes												

3.- Does your winery make wine on site?

	yes	no
Please select		

4.- How long has your winery been in operation?

	Less than 2 years	Between 2 and 5 years	Between 5 and 10 years	More than 10 years
Select period				

5.- What range best describes the average number of employees (part-time and full-time) during a 12 months period?

	Less than 15	Between 16 and 200	More than 201
Please select the range			

6.- What are the annual sales of your winery for the past 12 months?

7.- What are the annual gross profits of your winery for the past 12 months?

8.- What is your position in your firm?

Owner/CEO	General Manager	Operations Manager	Winemaker	Viticulturist	Quality Manager	Environmental Manager	Health and Safety	Other

9.- **Subjective norms:** When considering your winery's motivations to implement actions that preserve the environment, are the following agents an important source of pressure for your firm?

	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
Final consumers	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Competitors	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Government	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Wine and grapes associations	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Environmental groups	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Employees	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Suppliers	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Citizens/communities	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Public media (newspapers, trade articles, TV, radio, etc.)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

10.- **Environmental Commitment:** Please indicate to which extent you agree with the following sentences:

	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
The environmental objectives are perfectly defined at your winery.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The budget for environmental investment represents an important percentage of the total investment budget of your winery.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Your winery uses some environmental impact correction measures such as, purifiers, waste treatment, and/or recycling, soil restoration, air filters, water treatment.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
At your winery, technologies are used that minimize water consumption	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Your winery attempts to substitute the raw materials/products used that pollute the most with others that pollute less.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
At your winery, technologies are used that minimize the pollution produced and that prevent a subsequent purification and/or waste treatment process.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The employees at your winery	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

<p>receive training on environmental issues.</p> <p>Your winery attempts to substitute fertilizers that pollute the most with others that pollute less.</p> <p>Your winery attempts to substitute the most harmful pesticides with less damaging alternatives.</p> <p>Environmental protection is one of the basic values of your winery's policies.</p> <p>It is clearly established who on the staff at your winery assumes the environmental responsibilities.</p> <p>Your winery periodically prepares an environmental report for the shareholders or owners.</p> <p>The environmental measures adopted by your winery are certified.</p> <p>Your winery reports its environmental behavior to its consumers</p> <p>Your winery requires its suppliers to be environmentally certified.</p>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
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11.- **Information Scanning:** Please consider the process of searching for information regarding environmental care used in your winery, and indicate to which extent you agree with the following sentences:

	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
The management team makes a deliberate effort to search for information about environmental care	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The management team searches for information about environmental care on a regular basis	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The management team uses a pre-established methodology to search for information about environmental care	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The management team focuses the searching effort on specific areas considered crucial regarding environmental care (environmental practices, legal aspects, clean technologies, etc)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The information found is always analysed	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The information found is always understood	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The information found is always stored	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Once the information has been processed	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

(analysed, understood and stored) it's always incorporated into the environmental strategy					
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12.- **Attitudes and Perceptions of Control:** Please indicate to which extent you agree with the following sentences:

	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
The management team feels the future of the firm will improve as a consequence of actions that preserve the environment	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The management team perceives the actions that preserve the environment as having positive implications for the firm	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The management team perceives actions that preserve the environment as a potential gain	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The management team believes benefits will be derived from actions that preserve the environment	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The management team has a choice about whether or not to implement actions that preserve the environment	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The management team feels it has	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

the capability and technical knowledge to implement actions that preserve the environment					
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13.- **Environmental Performance:** According to your perception, please evaluate your firm for the past 12 months in relation to the industry average

	Much less than industry average	Less than industry average	The same than industry average	More than industry average	Much more than industry average
Internal recycling of waste material	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Consumption of waste internally	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Reduction of total tonnage of solid wastes	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Reduction of total volume of liquid wastes	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Air emissions reductions	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Energy saving, through internal policies and/or energy-efficient equipment	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Water consumption reduction	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Substitution of hazardous materials for non-hazardous materials in processes	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Substitution of environmentally-harmful pesticides for less harmful alternatives	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>