Materialism and Green Consumer Behaviour in Hong Kong

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Statement of Originality

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Synopsis

This dissertation examines how materialism affects the green consumer behaviour in Hong Kong. The primary purpose of the study is to understand the green consumer behaviour in a community so that the findings would fill the knowledge gap in green marketing and facilitate marketers to formulate their green marketing strategies. Hopefully, green marketing would become an effective measure for sustainable development.

The study takes a quantitative approach and uses self-completion questionnaire to obtain data from a student sample by convenient sampling. Two hundred and sixteen completed questionnaires were collected for analysis. Besides descriptive statistics, structural equation modelling was used to test the mediator effect of environmental concern, and the moderator effect of materialism on green purchasing behaviour.

The findings support that environmental concern is a mediator of the relation between environmental beliefs and green purchasing behaviour. This may explain why environmentally responsible purchase is much less than the level of environmental awareness. On the other hand, materialism as a whole does not have significant moderator effect on either environmental beliefs or environmental concern and green purchasing behaviour.

However, materialism has recently been identified as a factor negatively
affecting the environmental belief and green consumer behaviour in other studies. Cultural difference may be an explanation. On the materialism scale, the exploratory factor analysis shows that the dimensionality of the items in this study does not match with the dimensionality of the scale used in other studies.

From descriptive statistics, the level of green purchasing behaviour in Hong Kong is not high, but above the average; and there is no gender or age difference on green purchasing behaviour.
Chapter 1 Introduction

1.1 Background

Sustainable development and climate change are not only relevant but also crucially important topics among business leaders, politicians, and the general public today. While consumption of goods and services helps with economic growth, the possession of goods beyond its instrumental value for satisfaction and happiness of consumers, known as materialism, would render the world with limited resources unable to support the unlimited growth (Harman, 1996). To address the impact of consumption on environment, green marketing has been suggested as a strategy for corporations to satisfy the needs of consumers, to contribute to economic growth, and to help protect the environment (Polonsky, 1994). However, the development of green marketing in many communities was not very successful in the past (Polonsky and Rosenberger III, 2001; Peattie and Crane, 2005).

There are many reasons for the failure in green marketing. At the operational level, corporations may focus on the short term profit and abuse the eco-label or eco-advertisement (D'Souza et al., 2006; Polonsky et al., 1998a). Consequently, some consumers lose confidence in buying the so called green product which is priced with a premium but is inferior to traditional product in terms of their quality or functionality (Peattie and Crane 2005; Polonsky and Rosenberger III, 2001). On the other hand, some consumers profess on their green purchase intention but do not turn their environmental
concern into green purchasing behaviour (Fraj and Martinez, 2007; Follows and Jobber, 2000; Roozen and De Pelsmacker, 1998; Wong et al., 1996), and thus sending a wrong signal of green behaviour to the market. At the strategic level, green consumption has not been fully recognized as a pro-social behaviour of selling a public good inside a private good (Ferraro et al., 2005; Lee and Holden, 1999), and therefore may not have enough support from pro-social group. From the economic perspective, green products are not competing with traditional products at a level playing field, as the latter may externalize the environmental costs and therefore in a better financial position (Peattie and Crane 2005). In the academic world, most research works on green marketing were narrowly focused on the micromarketing of the managerial and tactical aspects (Chamorro et al., 2009; Kilbourne and Beckmann, 1998).

Recently, materialism has been identified as a factor negatively affecting the environmental belief and green consumer behaviour (Kilbourne and Pickett, 2008; Fraj and Martinez, 2007; Dietz et al., 2005). In the United States, it was shown that materialism has a negative effect on environmental beliefs which has a positive impact on environmental concern and environmentally responsible behaviour (Kilbourne and Pickett, 2008). However, there has not been much work conducted on this aspect in Hong Kong, a financial centre in Asia, where materialism has a role to play.

1.2 Purpose and Rational
The purpose of this study is to understand the green consumer behaviour in
Hong Kong, in particular on how materialism affects the behaviour of consumers. It is expected that the findings of the study would provide information to fill the knowledge gap on green marketing, facilitate marketers to formulate green marketing strategies, contribute to protection of the environment in Hong Kong, and enhance sustainable development.

The approach of this study follows the argument of Peattie (2001) that research should aim at understanding why consumers are supporting green purchasing rather than focusing on finding out “who the green consumers are”. As many studies report that there are cross-cultural differences on materialism (Ger and Belk, 1996; Sirgy et al., 1998; Griffin et al., 2004), it is meaningful to find out the relationship between materialism and green consumer behaviour in Hong Kong where East meets West in a major commercial and financial metropolitan.

The objectives of this study are to examine the moderator effect of materialism on environmental beliefs and environmental concern, and to study how such effect would impact on the green consumer behaviour in Hong Kong.

1.3 Research Questions
The general research question of the study is “how materialism affects green consumer behaviour in Hong Kong?” As green consumer behaviour is affected by consumer’s environmental beliefs and environmental concern (Kilbourne and Pickett, 2008), specific questions that help answer the general
question are:

i) To what extent does materialism affect environmental beliefs of green consumer?

ii) To what extent does materialism affect environmental concern of green consumer?

iii) To what extent do environmental beliefs affect green consumer behaviour?

iv) To what extent does environmental concern affect green consumer behaviour?

1.4 Theory and Framework

The underlining theory supporting the study of green consumer behaviour in this research is the Theory of Reasoned Action (Ajzen and Fishbein, 1980). Based on this theory, Kalafatis et al. (1999) propose a consumer behaviour model of “value-attitude-intention-behaviour”, which is modified and used as the framework for this study. According to Schwartz and Bilsky (1987) cited in Dietz et al. (2005), values are concepts or beliefs about desirable end states or behaviours that transcend specific situations. Beliefs are understandings about the state of the world by individual (Dietz et al., 2005). Therefore, the construct of environmental beliefs, instead of environmental value, is used in this study. The hypothesis of this study is that materialism has a moderation effect on environmental beliefs and environmental concern of the green consumer behaviour. Although green purchase intention is commonly used to indicate green consumer behaviour (D’Souza et al., 2007), it is replaced in
this study by the construct of green purchasing behaviour which has successfully been measured in a recent study (Kim and Choi, 2005).

According to the discussion mentioned above, the framework of this study and the associated hypotheses are shown below.

H1: Environmental Concern is a mediator between Environmental Beliefs and Green Purchasing Behaviour

H2: Materialism has a negative moderation effect between Environmental Beliefs and Environmental Concern

H3: Materialism has a negative moderation effect between Environmental Concern and Green Purchasing Behaviour

1.5 Research Design and Method
A cross sectional, quantitative survey by self-completion anonymous questionnaire is used to assess the effect of materialism on environmental beliefs and environmental concern, and to what extent these constructs affect the green purchasing behaviour in Hong Kong. The constructs to be measured in the study include materialism, environmental beliefs,
environmental concern, and green purchasing behaviour. The scales for measurement of materialism, environmental beliefs, and environmental concern have nine items, seven items and six items respectively; and the scales are adopted from a similar study of Kilbourne and Pickett (2008) carried out in the United States. The scale for measurement of the green purchasing behaviour has five items and is adopted from a study of Kim and Choi (2005). Altogether, there are 29 items in the instrument and all items are measured on a seven-point Likert scale based on the subjective assessment of the participants. Furthermore, the demographic information of the participants is collected for analysis. The dependent variable is green purchasing behaviour, and the independent variables are environmental beliefs, environmental concern, and materialism.

The sampling frame of the study includes students attending classes organized by the Hong Kong Management Association (HKMA) and students of a tertiary institution in Hong Kong. A non-probability sampling approach, using a convenience sampling method based on the consent of the institution and the lecturers concerned, is adopted.

The self-completion questionnaires were distributed to the students by the research student by hand in a classroom. The time required for the completion of the questionnaire was approximately fifteen minutes and the completed questionnaires were collected by the research student by hand or through a drop box near the classroom. Three hundred and seventy three questionnaires were distributed over a period of six weeks and two hundred
and sixteen completed questionnaires were obtained.

SPSS was used to analyse the data. The analysis includes descriptive statistics, Cronbach’s alpha for internal reliability of the scales, and exploratory factor analysis of the materialism scale. T-test was performed to test the demographic differences in green purchasing behaviour. Structural equation modelling using AMOS was conducted for confirmatory factor analysis of the materialism scale. It was also used for testing the mediator effect of environmental concern, and the moderator effect of materialism on environmental beliefs and environmental concern.

1.6 Implications
The research method involves the subject of human. Therefore, an ethics application has been submitted to the Human Research Ethics Committee (HREC) at the University of Newcastle for review to determine whether the proposed research work would create possible risks to research participants. According to the HREC, risk is the potential for harm, physical, psychological, social, economic, or legal, or the potential to cause people to think they have been treated disrespectfully. Therefore, the first initiative is that the participation in the research is voluntarily, and this is spelled out clearly in the questionnaire. Before approaching the potential subjects for their voluntary participation, consent has been obtained from the institution and the lecturer involved.
Second, the privacy of the participants is fully protected by reminding them that the survey is anonymous and they should not put their names or student numbers on the questionnaire, as it is a common practice for students to put their names or numbers on their assignment.

Third, the data collected will only be used for this study and therefore it is only assessed by the research student and his supervisor. At the end of the study, the data will be stored in a locked cabinet in the residence of the research student for a period of five years.

1.7 Limitations

This is a DBA dissertation based on a part-time study of nine months. Time is a constraint of the study, and therefore the study has a few limitations. First, there are many factors that affect green purchasing behaviour, such as trust in eco-label (Bjorner et al., 2004), effectiveness in green communication (D’Souza and Taghian, 2005), social value orientation (Gärling et al., 2003) and materialism. However, materialism is studied in isolation in this study. Therefore, the interaction effect of the factors that may affect the green purchasing behaviour is not included.

Second, with the continual addition of knowledge and publicity on climate change from NGO and government, it is anticipated that environmental value, attitude and behaviour of the public may change with respect to time. However, the research takes a cross-sectional approach; it does not follow how changes in environmental value and attitude over time may affect the
green consumer behaviour.

Third, the use of students of HKMA and a tertiary institution in Hong Kong as the sample frame limits the interpretation of the findings to all consumers in Hong Kong. However, the sample of the students consists of both part-time mature students and full-time younger generation. The findings from this sample would nevertheless provide some insight on the green consumer behaviour in Hong Kong.

1.8 Outcome and Contributions
The findings of the study indicate that the young generation has a higher materialistic value; however, it does not lead to a significant difference on green purchasing behaviour between the young and the mature age group. On psychological aspect, environmental concern has a total mediator effect between environmental beliefs and green purchasing behaviour. Although the overall materialism does not have a moderator effect on environmental beliefs, one of the three factors of the materialism scale has a negative moderator effect on environmental concern and green purchasing behaviour.

This research looks at a very fundamental issue in consumer behaviour, the lifestyle of materialism. This consumer behaviour is crucial in voluntarily pro-social approach of environmental protection. Given that materialism has cross-cultural differences (Ger and Belk, 1996), the findings of this research will shed light on how important it is to consider the lifestyle of consumers in predicting their green purchasing behaviour in Hong Kong for environmental
1.9 Overview of Structure

This dissertation consists of five chapters. Chapter two gives a literature review on green marketing, theory of consumer behaviour, factors affecting green consumer behaviour, materialism, and green consumer behaviour in Hong Kong. Chapter three describes the research method, including sampling approach, data collection, and data analysis. Chapter four presents data analysis using the software SPSS and the findings. Chapter five presents the discussion of the result and conclusion of the study.
Chapter 2  Literature Review

2.1 Introduction
The purpose of this chapter is to review the literature pertinent to the research question ‘How materialism affects green consumer behaviour in Hong Kong?’ so as to summarize what has been done and identify the knowledge gap in this area. The parent literatures on green marketing include articles on green marketing theory, the environmental benefit of green marketing, the competitive advantage of green marketing, and the communication in green marketing. The intermediate literatures cover green consumer behaviour. It starts from the theory of consumer behaviour, which forms the basis for the development of various theories on green consumer behaviour. The literatures then cover the most researched area of characterization and profiling of green consumers based on demographic and attitudinal characteristics. The topics that follow include the effect of eco-label and eco-advertisement on green consumer behaviour, the cultural influence, and other key factors, such as dominant social paradigm and materialism. Under materialism, there is a review on what materialism is before discussion on materialism and environment. Lastly, the cultural difference on materialism is highlighted with a general review on the green consumer behaviour and materialism in Hong Kong.

2.2 Green Marketing
This section starts with a brief introduction of green marketing, which is followed by the theory of green marketing. It then examines whether green
marketing helps protect the environment, reviews its competitive advantages, and presents how green products communicate with customers.

Green marketing is a poorly defined term in both academic and commercial world. It was firstly mentioned in 70’s but had not received much attention until the late 80’s and early 90’s when consumers and corporations were asked to contribute to sustainable development (Polonsky, 1994; Kilbourne and Beckmann, 1998). In early 1990’s, there were only a few green products or services available for green consumers to choose from. Many corporations took the opportunity of an immature market on green products and irresponsibly claimed that their products were green. As a result, many consumers have lost confidence in buying the so called green products which were generally priced with a premium but may not be functioning as good as a similar traditional product (Peattie and Crane, 2005; Polonsky and Rosenberger III, 2001). However, as consumers are becoming more environmentally conscious and expected to help save the environment, there is room for further research and development on green marketing (Chamorro et al., 2009).

2.2.1 Theory of Green Marketing

There was little developed theory on green marketing when the subject was reviewed by Kilbourne and Beckmann (1998). After the failure of green marketing in the turn of the century, some researchers and marketers started rethinking what green marketing should be. In mid 90’s, Polonsky (1995) proposes green marketing on the basis of stakeholder theory, and suggests a
four steps stakeholder management process to understand and to socialize with the stakeholders with a view to formulating more effective environmental marketing strategy. The first step is to identify the main groups of stakeholders, which is followed by the determination of the stakes and major concerns of the groups on the green marketing strategy of the firm. Then an assessment is made to determine how to meet each group’s environmental expectations with respect to the existing environmental behaviour of the firm. Lastly, the firm should develop green marketing strategies to socialize with the major stakeholder groups. There was another study in the United States and Australia focusing on market perceptions of stakeholders’ potential to influence the green product development process and strategies to involve stakeholders in green production (Polonsky et al., 1998a). The finding of the study suggests that marketers believe that stakeholders with "high" influencing abilities should be involved in the green product development process. Unfortunately, many firms chose to adopt very basic approaches to work with these stakeholders to gain the short term benefits from the green consumers and there was not much interaction and cross learning between the firms and the stakeholders.

Recognizing that many green marketing practices are focused on the short term tactical approach to attract green consumers, Menon et al. (1999) examine the concept of green marketing from each element of the marketing mix and the perspective of business performance, and propose a new paradigm for green marketing at both the tactical and strategic level. This is known as an environmentally based marketing program. It focuses on
product, distribution, promotion, pricing and market selection and links the business environment, such as customer expectation, competitive intensity, market opportunity, and regulatory environment to customer response and financial performance. This is one of the early theories that call upon a holistic approach to address the green marketing issue based on marketing mix, and this conventional marketing approach is still being adopted in recent research in this area (Rex and Baumann, 2007).

There is another study on re-evaluating green marketing that comes up with a similar finding of an integrated strategic approach to green marketing (Polonsky and Rosenberger III, 2001). The authors argue that opportunistic and tactical green marketing are not sustainable unless they are supported by a broader organizational greening. Firms should take an integrated approach to tackle the complex environmental issue. With that approach, the “enviropreneurial” concept would help firms promote innovation and obtain competitive advantage by creating a new playing field on the environmental front. The authors also provide details on the implementation of the proposed green marketing strategies and tactics to illustrate how such competitive advantage can be achieved.

More recently, there are two additional research works on stakeholder theory and green marketing (Maignan et al., 2005; Rivera-Camino, 2007). The work of Maignan et al. (2005) focuses on the implementation of a socially responsible marketing strategy and the authors provide a framework for a step-by-step approach to associate with the stakeholders for achieving the
socially and environmentally acceptable marketing operation. The study of Rivera-Camino (2007) makes use of the concept of “enviro-preneurial” (Menon and Menon, 1997) and the stakeholder theory to show that corporations need to develop the green marketing at the strategic and the tactical levels to address the concern of the stakeholders. These two studies reinforce the importance of stakeholders in the success of green marketing, and at the same time, encourage firms to take up an integrated approach in developing their green marketing at both the strategic and the tactical levels.

Based on the segmentation of green consumer in Australia by Said (1997 cited in D’Souza, 2005), D’Souza (2005) suggests a green marketing approach of “proactive environmentalism” by targeting the various categories of green consumers through a concerted effort of the business sector and the government. This involves environmental education by the government and the production of low price or high price high quality green products by the business sector.

Peattie and Crane (2005) review the theory of green marketing by using a classic concept of marketing and identify that there are five different types of “false marketing” that hinder the proper development of green marketing. They are green spinning, green selling, green harvesting, enviropreneur marketing and compliance marketing. The study concludes that green marketing has not yet been properly developed as it has not received sufficient support from the perspective of either marketing or environmental protection. This finding reinforces the earlier finding of Kilbourne and
Beckmann (1998) that macro marketing research on green marketing has not received proper and sufficient attention. Under green marketing, macro marketing is defined as the marketing activities that place concern on the environmental effect, environmental value and sustainability; whereas micromarketing is primarily concerned with the managerial perspectives such as the understanding of the characteristics and segmentation of green consumers (Kilbourne and Beckmann, 1998; Chamorro et al., 2009). A characterization of the research on green marketing from 1993 to 2003 identifies that most of the research works are empirical, and concentrated on the micromarketing of managerial aspects of characterization and profiling of green consumers (Chamorro et al., 2009). According to this finding, it is obvious that there is not enough work on macro marketing for protecting the environment. Is there any reason why researchers are not interested in macro marketing of green products? Perhaps the answer to the question of whether green marketing can help protect the environment would give some ideas on this.

2.2.2 Does green marketing help protect the environment?

Based on a qualitative model for analysis of the green product development from the perspectives of demand and supply, and the policy of environmental protection, Chen (2001) uses two examples to show that green product development under strict environmental standards may not be a viable alternative to protect the environment. This finding is contradictory to the general belief that green purchasing would help protect the environment. Ferraro et al. (2005) examine green marketing from the economic context
and highlight that environmental quality is in fact a public good. Therefore, the practice of green marketing is selling a public good inside a private good, which is not an easy task to accomplish. Based on such findings, the authors argue that direct payment would be more efficient than price premium as a policy instrument for environmental protection if it is accepted by the society. If the society does not accept direct payment for environmental protection, the price premium is a better approach than the policy of subsidizing capital acquisition of green product.

After reviewing the history of green marketing over a period of more than ten years starting from early 1990’s, Peattie and Crane (2005) conclude that green marketing has yet to come. It is because that green marketers and conventional product marketers have been competing in a sloping playing field that is created by a social-environmental subsidy to the conventional product marketers, by allowing the latter to externalize the social-environmental costs. The authors therefore argue that, under such circumstances, perhaps sustainability should be achieved through other policy measures such as taxation, education, public spending and industrial policy.

Peattie (2001) points out that green purchasers are different from green consumers and it is difficult to predict the behaviour of green consumers as they are neither predicted by the social–demographic characteristics nor their knowledge on environment. Therefore, green marketers should understand the need of green consumers and develop products to suit them rather than
focusing on selling their products through green advertisement. Ginsberg and Bloom (2004) point out that there is no single green marketing strategy that fits all situations for a corporation. How environmentally friendly a product is would depend on the market demand and competition.

Based on the findings of the above studies, it can be seen that green marketing is not an unequivocally effective measure for environmental protection. The environmental effectiveness of green marketing would depend on how green marketing strategies are implemented by producers and marketers, and how these strategies are received by consumers and other stakeholders such as green groups and legislators.

2.2.3 Green marketing and competitive advantage

Although there are arguments that green marketing may not help protect the environment, many corporations are interested in it as it may create a competitive advantage (Chen et al., 2006; Miles and Covin, 2000). When a corporation is committed to a green marketing strategy, it should not limit its activities to promotion or green advertisement of the products. Instead, the corporation should engage in a broad range of green production activities from product design, production, and distribution to after sale service. In so doing, corporation would create a competitive advantage with a first mover advantage in addressing the demand of the green consumers and on compliance with any new environmental regulations (Chen et al., 2006; Polonsky, 1994). Recently, the success of Toyota in selling hybrid vehicles is a good example of first mover advantage on investment in green marketing
(Polonsky and Rosenberger III, 2001). Toyota’s Prius has been on the road starting from the late 90’s, and GM’s focus on gas guzzler instead of energy efficient vehicle is blamed as one of the factors for her failure (Goldman, 2009).

Despite of the evidence supporting that green marketing may create competitive advantage, Baker and Sinkula (2005) argue that enviropreneurial marketing, a term for pioneer in green marketing, would enhance firms’ capabilities and success in new product development, but it should not be considered as a competitive advantage in terms of market share. In considering whether green marketing provides a competitive advantage to a firm, it should be noted that green advertisement and green communication have a role to play.

**2.2.4 Green advertisement and communication**

To many consumers, green advertisement and green label are the major sources of information for differentiating green products from traditional products (Grankvist et al., 2004). Therefore, green advertisement and green labels are important communication channels for a firm that adopts either a long term strategic position in green marketing or a tactical approach for a short term gain from green consumers. Unfortunately, the extensive abuse of green label and green advertisement at the early stage of green marketing in the mid 1990’s has created negative feelings among many consumers toward green advertisement and green label. For instance, through a content analysis of the environmental information on packaging of dishwashing liquid
in a large city in Australia, Polonsky et al. (1998a) reveal that a majority of the packaging information is not accurate. Under such circumstances, it is very difficult for the genuine green marketers to communicate with the green consumers (Newell et al., 1998).

In recent years, many researchers have shown that green label is not very useful in attracting consumers to purchase green product. In New Zealand, despite two previous studies have concluded that tourists have positive attitudes towards the Green Globe 21 eco-label, the findings of a follow-up study indicate that the positive attitudes are not reliable predictor of responsible environmental tourist behaviour (Reiser and Simmons, 2005). In Australia, customers who have a lower involvement in environmental protection tend to have a stronger disregard for the green advertisement on all dimensions, such as company image, green label or recycling label (D'Souza and Taghian, 2005). The existing of greenwash in the market place of Australia (Murphy, 2009) may partly explain why green advertisement and green communication do not receive much support from customers with low involvement in environmental protection.

On the contrary, an extensive investigation in Denmark on the effect of a certified environmental label, the Nordic Swan, on consumers’ brand choices of toilet paper, paper towels and detergents, using a large Danish consumer panel with detailed information on actual purchases from the beginning of 1997 to January 2001, indicates that the Nordic Swan label has a significant effect on consumers’ brand choices. There is a marginal willingness to pay
13-18% more for the certified environmental labelled toilet paper, and information on environmental performance has an effect on consumers’ choice of detergent (Bjorner et al., 2004).

Although the certified green label in Denmark appears to be a supportive instrument to allow the green consumers and the green corporations to work hand in hand to address the environmental issue, Dosi and Moretto (2001) show, from the environmental economic perspective, that green label may not be a reliable environmental policy measure. It is because that firm may abuse the green label in investment in other traditional polluting activities by taking an advantage that some consumers may misinterpret the scope of the green label to cover all activities or products of the firm.

The above-mentioned findings show that the effectiveness of eco-label is location specific, and trust from customers is important. Clearly, how a firm socializes with the stakeholders as discussed under the theory of green marketing above has an impact on the success of a green marketing strategy. In this respect, it is important to have an understanding of the green consumer.

2.3 Theory of Green Consumer Behaviour
This section presents the literature review on the theory of green consumer behaviour. It starts with the theories of consumer behaviour, which include the commonly cited Theory of Reasoned Action (TRA) (Ajzen and Fishbein, 1980; Fishbein and Ajzen, 1975), and the Theory of Planned Behaviour (TPB)
It then introduces the theories on green consumer behaviour (Kalafatis et al., 1999; Follows and Jobber, 2000) that are built on TRA or TPB. There is another theory of green consumer behaviour based on pro-social behaviour (Lee and Holden, 1999).

2.3.1 Theory of consumer behaviour

Discussions on the theory of consumer behaviour started gathering some momentum from the middle of last century. At that time, the focus was primarily on the economic perspective of demand and supply, and on the multiple characteristics of goods that meet consumer’s preferences (Lancaster, 1966). The psychological consideration of consumer behaviour came into picture in the 70’s, and Fishbein and Ajzen’s TRA (Fishbein and Ajzen, 1975; Ajzen and Fishbein, 1980) has been receiving much attention from marketing researchers all over the world in the next ten more years (Sheppard et al., 1988). The TRA was modified to TPB (Ajzen 1985, 1991) which includes an additional element to cover the consumer behaviour that is not totally under the control of the consumer, something known as perceived control behaviour. These two theories have extensively been used in research works on green consumer behaviour (Sheppard et al., 1988; Kalafatis et al., 1999; Follows and Jobber, 2000).

The TRA suggests that consumer behaviour follows a casual sequence of attitude, subjective norm, and behavioural intention. The starting point, attitude is formed from a combination of factors such as people’s value, beliefs, and assessment of the outcome of behaviour. In the case of green
consumer behaviour, it is the environmental value and beliefs that affect the overall environmental attitude, which in terms affect the environmental concern, and purchase intention of environmentally friendly products (Kalafatis et al., 1999). The subjective norm in the TRA is the perception of social pressure by the consumer on his consumption behaviour, the effect of self-identity on green consumption is an example relating to the subjective norm (Sparks and Shepherd, 1992). Sparks and Shepherd (1992) hypothesize that there is a dependent relationship between self-identity and behavioural intention under the TPB. However, the findings of their study show a substantial independent effect of self-identity. The authors therefore conclude that self-identity is an important element in TRA and highlight that it should receive more attention in behavioural research.

Based on a meta-analysis of the TRA, Sheppard et al. (1988) identify that more than half of the research under their studies have utilized the Fishbein and Ajzen model for investigation of activities that are not within the boundary conditions of the model. Although the model is developed for predicting behaviour, it performs extremely well in the prediction of goals and activities that involve the choice of alternatives that are beyond the model boundary of behaviour and are under the subject’s incomplete volition control. Therefore, Sheppard et al. (1988) argue that the Fishbein and Ajzen model does not distinguish between the subject’s behavioural intentions from his own estimation of the future behaviour, and recommend additional research work to modify the model. In parallel with such recommendation, TPB was published (Ajzen, 1988). The theory includes an element of perceived
behavioural control to address the limitation of incomplete volition control by the subject, and the perceived behavioural control would work together with the behavioural intention for prediction of behaviour. A review of the TPB concludes that the theory is useful to predict intentions to perform behaviours from attitude towards the behaviour, subjective norm, and perceived behavioural control (Ajzen, 1991).

2.3.2 Theory of Green Consumer Behaviour

Green consumers, like many other consumers, have their specific behaviour in purchase decision. An understanding of this consumer behaviour is crucial for success in green marketing. Kalafatis et al. (1999) adopt Ajzen’s TPB to study the determinants that affect the purchase intention of consumers on environmentally friendly products in two different markets, one in UK and the other one in Greece for cross-examination. The findings of the study support that TPB is a reliable model for predicting the purchase intention of consumers for environmentally friendly products. However, there are some factors that affect the validity of the model, such as the development or learning of beliefs in a society and the relative market maturity. For instance, the UK market is considered more mature than the market in Greece, as the consumers in UK are well educated and aware of environmental issues, hence there is much more support for environmentally friendly products in the UK. The findings of the study also reinforce that TPB is useful for providing knowledge on the formation and development of attitude, subjective norms and perceived control among green consumers.
Follows and Jobber (2000) propose a model to predict green consumer behaviour based on the TRA (Ajzen and Fishbein, 1980) with the element of intention to mediate the effect of attitude on behaviour. The model is tested by covariance structure analysis on a specific product of baby diaper, and an individual’s estimation of the likelihood of the purchasing behaviour is used to measure the intention in the study. The result of the study confirms the hierarchy relationship of value-attitude-intention-behaviour in environmentally responsible purchasing, and shows that a direct relationship between value and intention; or between attitude and behaviour does not exist. However, the findings of the study suggest that purchasing behaviour of environmental product is strongly affected by individual consequences associated with the purchase. This finding helps explain the common phenomenon why consumers exhibit a high degree of concern on the environment, but does not transfer the concern to a corresponding high rate of purchasing of environmentally responsible product than the traditional product.

Another theory of green consumer behaviour is proposed on the basis of Batson's model of pro-social behaviour by Lee and Holden (1999). In this theory, it is recognized that green consumer behaviour is a pro-social behaviour and green consumers are buying a public good inside a private good. The theory suggests that there are two independent determinants of environmental behaviour, one is the motivation arising from internal responses of distress, and the other is the motivation arising from empathy. Furthermore, the study shows that some environmentally conscious consumer behaviours are related to other determinants such as perceived
consumer effectiveness and faith in others. This leads to the following discussion on the determinants of green consumer behaviour.

2.4 Factors affecting the green consumer behaviour

Culture has a key role to play in human behaviour, and it has been receiving attention in marketing research in recent years (Lenartowicz and Roth, 1999). Based on the model of reasoned action, Taghian and D'Souza (2007) show that Australian students and Malaysian students living in Australia exhibit the cultural differences on purchase intention and planned behaviour. Although culture may affect purchasing intention, it may not be the key factor. A study among the ethnic Chinese in Malaysia shows that heterogeneity exists in cultural orientations on purchase intention, and product quality is identified as the most important criterion in making a purchase decision among the subjects with both high and low culture values (Ong 1993).

Although culture influences purchase intention, many studies confirm that Fishbein-Ajzen's behavioural intention model works outside United States in which the model is developed (Taghian and D'Souza, 2007; Chan and Lau, 1998; Lee, 1991). Specifically, the study of Chan and Lau (1998) demonstrates that Fishbein-Ajzen's model works under Chinese culture in both the mainland China and Hong Kong.

However, it is not easy to isolate a single factor of culture from other macro-environmental factors that influence human behaviour in a research study (Sekaran, 1983); and it is also difficult to operationalize culture in
consumer research (Sojka and Tansuhaj, 1995). In searching for operationalized culture, Lenartowicz and Roth (1999) propose four different topological approaches for cultural assessment. They are ethnological description, use of proxies such as regional affiliation, direct values inference, and indirect values inference or benchmarking. As each approach has its own weakness, Lenartowicz and Roth (1999) conclude that no single approach is relevant for a complete cultural assessment in business studies.

Under the topology of direct values inference, Hofstede (1991, 2001) proposes a measurement of culture by five different dimensions. They are individualism or collectivism, uncertainty avoidance, power distance, masculinity or femininity, and long term orientation. Although these dimensions of culture are primarily developed for human resources management, they are also used in marketing studies. A recent review of the topic by Soares et al. (2007) highlights the advantage of using the cultural dimension of Hofstede’s values, but it also suggests that a three-step approach including nationality and individual culture level should be used together with Hofstede’s dimensions to operationalize culture in marketing.

Even with effective communications between the green consumers and the green marketers, green consumers may not necessarily choose the green products when they make their purchase decision (D'Souza et al., 2006). There are numerous reports suggesting that the increase in the awareness of and concern on the environment among the consumers does not lead to a corresponding increase in the sale of green products (Wong et al., 1996;
Roozen and De Pelsmacker, 1998; Follows and Jobber, 2000; Fraj and Martinez, 2007). Yam-Tang and Chan (1998) surveyed 552 Hong Kong citizens to examine how consistent consumers' actions are with their attitudes towards seven environmentally sensitive products. The result shows that consumers' environmental concern is not reflected in their purchasing behaviour. Although another study in Spain on determination of the importance of ecological attribute, branding, and eco-labelling on product attitude and purchase intention of washing powder supports the hypothesis that ecological attributes correlate positively with the purchase intention of environmental products (Rios et al., 2006), its effect is smaller than other functional attributes of the product. This report once again supports that environmentally responsible purchase is much less than the level of environmental awareness or attitude. At the level of the brand, a strong belief on the brand’s environmental performance enhances the consumer attitude, and the effect of eco-label could be enhanced by a certification body (Bjorner et al., 2004). The findings of these studies indicate that there are many factors affecting the attitude and beliefs of green consumers on their green purchase decisions.

2.4.1 Demographic characteristics of green consumer

Based on a review of research works on green marketing, Kilbourne and Beckmann (1998) report that many researchers have focused on micromarketing of finding the determinants to predict the purchasing intention of green consumers. They argue that there is not enough research on green macro marketing such as the theory of green consumer behaviour or the
environmental benefits of green marketing. However, many researchers continue to study the demographic characteristics for predicting of green consumer behaviour (Laroche et al., 2001; Jain and Kaur 2006; Shen and Saijo, 2007).

In searching for who is willing to pay more for environmentally friendly product and the reasons for such behaviour, Laroche et al. (2001) find that female, married, and with at least one child living at home is the segment to be focused on. It is because that these customers consider that ecological problems are severe and corporations are not acting responsibly toward the environment. They also consider that it is not very inconvenient to act in an ecologically manner in making a purchase decision. The gender difference in environmentalism is also supported by another study on gender and values (Dietz et al., 2002), and the findings suggest that the gender difference in environmentalism in the United States is primarily related to the differences in altruism between women and men.

In re-examining the socio-demographic characteristics of residents in Shanghai, China and their relations to environmental concern, Shen and Saijo (2007) reinforce that the household income and education level are positively related to environmental concern. However, in contrary to other studies, the age is also positively related to environmental concern. Neither household size nor employment status has any correlation with the environmental concern. A recent exploratory study in India (Jain and Kaur, 2006) also shows that socio-demographic characteristics and various
construct of environmental consciousness have a significant correlation.

Chan (1999a) studies the green consumers in Hong Kong based on their purchasing experience of environmentally friendly products as well as the not-so-friendly products. Demographic characteristics and other environmental related variables such as knowledge on green consumerism and perception on green products are used to differentiate the green consumers. The findings suggest that the highly committed green consumers have a higher education and a higher household income. They have much knowledge on environmental protection and are more open to receive green information from others. They also have a strong self-identity as a green consumer. On the other hand, less committed green consumers have difficulty in access of the green products. The applicability of using demographic characteristics for profiling the potential green consumers in Hong Kong are supported by two recent studies (Wong and Wan, 2009; Lee, 2009). Lee (2009) concludes that female adolescents have a significantly higher environmental beliefs, environmental concern, perceived seriousness of environmental problems, perceived environmental responsibility and green purchasing behaviour, but male adolescents have a significantly self-identity in environmental protection. Wong and Wan (2009) conclude that environmental concern is affected by a combination of gender, education level, environmental beliefs, and government performance on environmental protection.

However, Peattie (2001) suggests a different approach to analyse the green
consumption and green marketing by focusing on investigating the reasons why someone decides to purchase green products, instead of characterization and profiling of the green consumer. It is argued that the research in the past twenty years on finding the green consumer by socio-demographic and personality-based influences would not be meaningful. Instead, focus should be placed on the understanding of the perceived consumer effectiveness and the cost and benefit to the green consumer on their green purchasing. The economic aspect of green marketing is supported by Meyer (2001) who demonstrates that successful green marketing should take into account of the products’ core value as well as its environmental benefit. However, it is cautioned that the economic approach in green marketing should be a supplementary rather than a replacement of the behaviouristic approach.

The findings of the above-mentioned studies show that the relationships between socio-demographic characteristics and the environmental concern or green consumer behaviour are equivocal. Furthermore, there are findings from other research works that do not support that demographic characteristics are useful predictors for green consumer behaviour (Tanner and Kast, 2003; Straughan and Roberts, 1999; Roberts, 1996). In profiling the green consumers in the 90’s, Roberts (1996) reveals that demographics only explain six percent of the green consumer behaviour; whereas the perceived consumer effectiveness turns out to be the best predictor. In identifying the suitable criteria for predicting the ecological conscious consumer behaviour for marketing segmentation purpose, Straughan and
Roberts (1999) report that psychological criteria are more useful than demographic criteria in predicting the ecological conscious consumer behaviour. In the same study, it is identified that the perceived consumer effectiveness in environmental protection correlates very well with the ecological conscious consumer behaviour. In view of the complexity of green purchasing, Polonsky et al. (1998b) suggest that marketers may explore the concept of segmentation in their product offering, however, the details of the organization, the segment and the purchasing agents should also be considered in the segmented market. The approach of segmenting the green consumers with different product offering is also supported by D’Souza (2005).

2.4.2 Psychological characteristics of green consumer

Recognizing that demographic characteristics may not predict the behaviour of green consumers, some researchers have turned to the area of cognitive psychology for a solution to the problem. Fraj and Martinez (2007) propose a model that includes emotional, cognitive, and conative components to predict the attitude and behaviour relationship of consumers in their study of the effect of affect commitment, verbal communication, and actual commitment on ecological behaviour. Similar to some earlier research works such as that reported by Peattie (2001), the findings of this recent study support the argument that consumers are still professing their concerns on the environment, but they do not turn those concerns into ecological consumption behaviour. However, the findings of the study support that ecological behaviour is better predicted by the affect commitment of the
consumers than their environmental attitude, even though that affect commitment is likely to determine the environmental attitude. A possible explanation is that environmental knowledge is a mediator in the ecological behaviour. Unfortunately, the parameter of environmental knowledge is not measured in the study.

The impact of attitudes and personality characteristics on pro-environmental behaviours from the perspective of a locus of control is examined by using a model that links a related construct and an environmental locus of control to a series of pro-environmental behaviours (Cleveland et al., 2005). The findings of the study suggest that there are four distinct dimensions of environmental locus of control. They are biospheric-altruism, corporate skepticism, economic motivation and individual recycling efforts. However, there is no specific pattern to relate the environmental locus of control to the pro-environmental behaviour. The findings highlight the complex and specificity of pro-environmental behaviours, and the difficulty in their prediction.

The personal factors and the contextual factors on predicting the green purchasing behaviour is studied on selection of food from supermarket among Swiss consumers (Tanner and Kast, 2003). The findings support that green purchase is positively related to attitudes on environmental protection, fair trade, local products, and knowledge of environmental behaviour. It is noted that the time required and the frequency for shopping are barriers for green purchasing, but the green consumers are not price sensitive, nor
affected by other contextual factors such as education, household income, occupation, and employment status. However, the specific product used in this study is green food, and it is generally believed that consumption of green food is healthy for individuals and good for the environment. Unfortunately, the study does not differentiate whether the green purchase is for the environment or for personal health benefit.

Thogersen and Olander (2002) test the hypothesis that the emergence of sustainable consumption pattern is influenced by individual value priorities among the Danish consumers. A cross-lagged panel design and structural equation modelling are used in the study in order to draw firmer conclusions about the direction of causality. An important conclusion of this study is that the predominant causal influence between basic values and environmentally friendly behaviour indeed goes from values to behaviour, at least in the short-to-medium term perspective. When the auto-regressive effect of past behaviour is included in the structural equation, only one motivational value type (universalism) has a significant influence on environmentally friendly behaviour. It may be a surprise that none of the other motivational value types adds to the prediction of behaviour.

As there are so many research works on psycho-social determinants on pro-environmental behaviour in the last decade, a meta-analysis was conducted on this topic (Bamberg and Möser, 2007). The findings support that there is a stable association between psycho-social variables and pro-environmental behaviour in the last two decades, from 1986 to 2006,
despite the economic and political changes over this period of time; and such behaviour is a result from the mixing of self-interest and pro-social motives.

The findings of the research work mentioned above demonstrate that green consumer behaviour is a complex issue. There is strong support on psycho-social determinants on pro-environmental behaviour, especially the model of value-attitude-intention-behaviour and the positive relationship between environmental attitude and green purchasing. However, it is evident that people are still professing on their green behaviour. Therefore, further research on this complex green purchasing behaviour is needed.

Besides psychology, anthropology also has contribution to the behaviour of green consumers. Tadajewski and Wagner-Tsukamoto (2006) introduce a new qualitative method that is theoretically underpinned by cognitive anthropology to study the complex green consumer behaviour through life-cycle analysis. The study examines the contextual aspects of problem-solving behaviour of green consumers by cognitive anthropology approach of in-depth, qualitative interviews with a wide range of green consumers from both UK and Germany. The findings of the study provide some interesting clues regarding the nature of information search and information processing of green consumers. It is revealed that green consumers of the top clusters are able to see and retrieve life-cycle information as it is offered by a shopping context. The findings of the study once again demonstrate the complexity of green consumer behaviour.
2.4.3 Effect of eco-label and eco-advertisement on green consumer

As discussed earlier, communication is an important element in green marketing as many customers rely on eco-label or eco-advertisement for information about the green products (Grankvist et al., 2004). The discussion in this section is not to repeat the earlier one, but to focus on how eco-label and eco-advertisement affect the green consumer behaviour. For instance, eco-label works better with consumers who have a stronger environmental concern. Consumers with intermediate environmental concern are unlikely to choose products with positive eco-label, but they would sort out products with negative eco-label (Grankvist et al., 2004). Another similar study on eco-advertisement confirms that there are differences between consumers with high environmental concern and low environmental concern towards the eco-advertisement. The consumers with low environmental concern are more likely to have a stronger disregard for eco-advertisement (D'Souza and Taghian, 2005). On the other hand, eco-label that provides clear and accurate environmental information would help consumers with high environmental concern to buy green products that are highly priced but they will not compromise on quality (D'Souza et al., 2006).

Although communication with consumers through eco-label or eco-advertisement help promote marketing of green products to consumers with high environmental concern, the consumers’ perception on the corporation that sell green products is an important factor affecting their perception towards the green product (D'Souza et al., 2006). Customers usually place negative perception on corporations that chase profit at the
expenses of the environment, and their past experience with the product is the only factor that helps create a positive perception on the corporation. Other factors such as the perception of green product, product ingredients, product package and label do not have much contribution.

2.4.4 The role of culture on green consumer behaviour

Culture has a key role to play in human behaviour, and it has been receiving attention in marketing research in recent years (Lenartowicz and Roth, 2001). Based on the model of reasoned action, Taghian and D’Souza (2007) show that Australian students and Malaysian students living in Australia exhibit the cultural differences on purchase intention and planned behaviour. However, culture may not be the key factor affecting purchasing intention. A study among the ethnic Chinese in Malaysia shows that heterogeneity exists in cultural orientations on purchase intention, as product quality is the most important criterion in making a purchase decision among the subjects with both high and low culture values (Ong 1993).

Although culture influences purchase intention, the study of Taghian and D’Souza (2007), Chan and Lau (1998), and Lee (1991), confirm that Fishbein-Ajzen's behavioural intention model works outside United States in which the model is developed. Specifically, the study of Chan and Lau (1998) demonstrate that Fishbein-Ajzen’s model works under Chinese culture in both the mainland China and Hong Kong.

However, it is not easy to isolate a single factor of culture from other
macro-environmental factors that influence human behaviour in a research study (Sekaran, 1983); and it is also difficult to operationalize culture in consumer research (Sojka and Tansuhaj, 1995). In searching for operationalized culture, Lenartowicz and Roth (1999) propose four different topological approaches for cultural assessment. They are ethnological description, use of proxies such as regional affiliation, direct values inference, and indirect values inference or benchmarking. As each approach has its own weakness, Lenartowicz and Roth (1999) conclude that no single approach is relevant for a complete cultural assessment in business studies.

Under the topology of direct values inference, Hofstede (1991, 2001) proposes a measurement of culture by five different dimensions, based on statistical analysis of multinational samples of work related values. They are individualism or collectivism, uncertainty avoidance, power distance, masculinity or femininity, and long term orientation. Although these dimensions of culture are primarily developed for human resources management, they are also used in marketing studies. A recent review of the topic by Soares et al. (2007) highlights the advantage of using the cultural dimension of Hofstede's values but it also suggests that a three-step approach including nationality and individual culture level should be used together with Hofstede's dimensions to operationalize culture in marketing.

Recognizing that culture plays an important role in green consumer behaviour, Laroche et al. (2002) carried out a quantitative survey in Canada to find out if cultural differences would drive differences in environmental knowledge,
attitudes, and behaviours. The cultural group under study is French-Canadian and English-Canadian. The findings of the study suggest that there are cultural differences among the study groups and such differences do cause differences in environmental purchasing behaviour with respect to the cognitive psychological model of “knowledge-attitude-behaviour” for green purchasing.

According to Yau (1988), Confucianism is deep rooted in Chinese culture which has five dimensions of orientation. They are man-nature orientation, man-himself orientation, relational orientation, time orientation, and personal activity orientation. Chan (2001) conducts a survey at two large cities in China, Beijing and Guangzhou, to verify a conceptual model of green purchasing behaviour, and confirms that the cultural values such as man-nature orientation and collectivism, and the psychological values such as ecological affect and ecological knowledge are related to the attitudes towards green purchasing. These attitudes link to green purchasing intention and subsequently to green purchasing behaviour. Thus the study supports that purchase intention is a mediator between the purchase attitudes and purchase behaviour. However, the relationship between purchase intention and purchase behaviour is not very strong. This is similar to the findings of other studies that green purchasing behaviour is less than that predicted by purchasing intention.

Under the same study, Chan (1999b) identifies that the environmental concerns of the respondents in China are much lower than that in America.
However, the green purchasing behaviour of Chinese follows a similar predictive model for the western culture, from knowledge to affect to intention and behaviour. It is suspected that the low green purchasing behaviour is attributed to the conservative Chinese culture and exaggeration on environmental claims of the product. The author therefore recommends that the Chinese government should strengthen the environmental education, increase investment on environmental infrastructure, and establish an eco-label system to increase the consumer’s confidence in green purchasing.

2.4.5 Other key factors affecting green consumer behaviour

Kilbourne and Polonsky (2005) studied environmental attitude and change in consumer behaviour. In their literature review, they point out that most research in this area has been focused on the relationship between environmental attitudes and specific purchase intention, and show that a positive relationship exists. However, there is not much increase in environmental purchase when it is compared to the increase in environmental attitude and awareness. The lack of improvement on marketing and the environment may be attributed to the overlooking of an area that may affect the consumer behaviour, which is known as dominant social paradigm (DSP). DSP is defined as “the shared beliefs and values that make up a culture’s worldview and that functions as ideology”. Therefore, they develop a casual model of environmental attitudes with respect to DSP of the western industrial society, and the result of a survey of the students in Australia and New Zealand confirms the casual model that DSP has an inverse relationship with environmental attitude and the perceived change. However, there is a
positive relationship between environmental attitudes and the perceived change. The findings clearly show that, in addition to environmental attitudes, there are other factors affecting the green purchasing behaviour. DSP is one of them. Therefore, there is room for additional work to understand the complicated environmental purchasing behaviour. For instance, there is a need to understand how consumers connect the environment and their consumption, and how such behaviour is affected by culture. On the DSP side, it is considered that policy makers who care for the environment should pay attention to the DSP within the consumers’ thinking, and come up with measure to effect the shifting of the DSP, rather than simply promoting the increase in environmental awareness.

More recently, DSP has been shown to have a strong correlation with materialism at the macro marketing level (Kilbourne et al., 2009). This finding suggests that the large gap between the environmental attitude and the environmental action is caused by focus of materialism at the micro-based perspective rather than at the institutional level, and therefore the causal relationship between DSP and materialism needs to be examined further at the macro marketing level.

Materialism has been recognized as a factor that affects green consumer behaviour (Kilbourne and Pickett, 2008; Muncy and Eastman, 1998). Following the development of the materialism scale by Belk (1985), materialism has been studied extensively in the last few decades (Fitzmaurice and Comegys, 2006; Chan et al., 2006; Griffin et al., 2004;
Kaminie and O’Cass, 2000; Ger and Belk, 1996). As materialism is a key variable in this study, a detailed literature review on the subject will follow. It covers what materialism is, materialism and environment, and cultural differences on materialism.

2.5 What is Materialism?

From the Oxford dictionary, materialism means “obsession with material possessions, bodily comfort, etc while neglecting spiritual values” (Lee, 2002). While it is interesting to note the use of the word “obsession” in the dictionary to explain materialism, there is a study showing that, on average, materialist as a consumer does have a lower ethical concern (Muncy and Eastman, 1998). Academically, Belk (1985) defines materialism as “the importance a consumer attaches to worldly possessions. At the highest level of materialism, such possession assumes a central place in a person’s life and is believed to provide the greatest source of satisfaction and dissatisfaction.” There are three traits in the domain of materialism, namely possessiveness, nongenerosity, and envy, which mean that materialist focuses on possession, does not share the possession with others, and dislikes others who possess more than he or she does (Belk, 1985). Recognizing the limitation of Belk’s scale on low reliability, Richins and Dawson (1992) offer another definition to materialism, which is based on instrument or terminal value. According to Richins and Dawson (1992), materialism is a long lasting desirability in acquiring and possessing things, and there are three aspects of consumer value in materialism, namely acquisition centrality, acquisition happiness, and possession-defined success. In layman terms, materialism is a lifestyle that
individuals seek more than instrument value from the goods they acquire. By so doing, materialists establish their identity and enhance their subjective well-being (Kilbourne and Pickett, 2008).

2.5.1 Materialism and Environment

Acquiring and possession of materials are the core behaviour of materialists as they are satisfied and happy with what they own. In this process, materialists consume or possess more than the instrumental value of goods, and thus exert pressure on the limited resources of the earth and create environmental problems. Although materialism and consumption support economic growth, Harman (1996) argues that a clean environment and a good quality of life cannot be met simply by materialism and unlimited economic growth. As materialism may have an adverse impact on the environment, marketers who have self-interest to promote materialism should ask the question whether it is ethical to encourage materialism. It has been said that materialist as a consumer does have a lower ethical concern (Muncy and Eastman, 1998).

Another aspect of materialism and environment is that whether materialism would have an impact on the environmental value, attitude, and concern of consumers. As mentioned earlier, materialism is considered “obsession” in nature (Lee, 2002) and it has been shown that consumers who hold low materialistic values are more likely to engage in pro-environmental behaviour (Tilikidou and Delistavrou, 2004). Reviewing the subject of environmental value, Dietz et al. (2005) identify that there are two major lines of research
from sociology, social psychology and political science to address the construct of environmental value. One is based on the value clusters of self-interest, altruism, openness to change, and traditionalism; and the other is based on the post materialist theory which suggests that environmentalism emerges when basic material needs are satisfied. However, the research findings on environmental values are equivocal.

Based on Maslow's theory of hierarchy of needs, Dunlap et al. (1975) cited in Dietz et al. (2005) suggest that the luxury of environmental concern would come after the basic material needs are satisfied. This argument is supported by the analysis of the data in the International Social Survey Programme from 1993 to 2000, in which global environmental protection is strongly correlated to the wealth of a country (Franzen, 2003). Although wealth is related to environmental protection, the increase in GDP from 1993 to 2000 does not lead to any significant increase in environmental concern (Franzen, 2003). On the other hand, there are research studies showing that people in less affluent societies have also expressed their concerns on the environment (Brechin and Kempton, 1994; Dunlap and Mertig, 1997); and there is a growing trend of ecological concerns among the less affluent societies around the globe (Alcamo et al. (2003) cited in Dietz et al., 2005). The review by Dietz et al. (2005) concludes that the link between post materialism and environmental concern is weak and further research is needed. Two recent studies, however, support that consumers who focus on possession of materials for happiness are less concerned on what is the effect of their purchasing (Kilbourne and Pickett, 2008) or post-purchase behaviour on the
environment (Tilikidou and Delistavrou, 2004).

2.5.2 Cultural Differences on Materialism

Materialism is a western living style that has been spread to a large population in North America and Europe in the 80's. It has also been spreading to other economies along side with the globalization of trade starting from the 90's (Belk, 1996). However, materialism in developing countries develops into a slightly different style than that in the western countries in which the possession seeking behaviour is pursued following the basic needs is fulfilled (Ger and Belk, 1996). Under the influence of marketing and advertisement, the materialism in developing countries has been developing at the economic stage in which nutrition for the entire population has not fully been satisfied (Wallack and Montgomery, 1992). So, will there be any difference on materialism among different countries within which not only materialism develops at different stage of the economic development, but they also have their own cultural influence on consumption?

There are several studies on cross-cultural differences in materialism (Ger and Belk, 1996; Sirgy et al., 1998; Griffin et al., 2004). The findings of these studies support that there are cultural differences on materialism. First, materialism is not unique to the western society and it is not directly related to the affluent of a nation (Ger and Belk, 1996). Instead, materialism may hint on social and economical development, in which social change includes change in institutions, economy, political conditions, privatization, marketization, urbanization, and change in people through emigration or
immigration. The social change, mobility, confusion in norms, together with the western influence and globalization seem to impel materialism (Ger and Belk, 1996). In a study of how television viewership affects people’s evaluation of happiness in their life across the United States, Canada, Australia, Turkey and China, only the data from the United States clearly support that television viewership makes people feel unhappy with their life. It is because that television advertisement in the United States encourages the so called terminal materialism, i.e. materialism for the sake of materialism (Sirgy et al., 1998). This study shows that there are cultural differences in materialism. In searching for a materialism scale for marketing research in cross-national study, the scale developed by Richins and Dawson (1992) is evaluated among several countries, and it is concluded that the cultural differences among different nations warrants an investigation into a new scale to measure materialism in cross-cultural contexts (Griffin et al., 2004).

Hong Kong is a Chinese society and the Chinese culture may have an impact on the interpretation of the western materialism (Eastman et al., 1997, Schaefer et al., 2004). Comparing the materialism at individual level across United States, China, and Mexico, Eastman et al. (1997) conclude that Chinese students are most materialistic, and believe that Hong Kong plays a significant role in impacting such behaviour. However, the findings of another study on materialism in adolescents in the United States, Japan, and China by Schaefer et al. (2004) do not support such conclusion. Instead, it was suggested that the Chinese teens are less materialistic. Schaefer et al. (2004) believe that the difference on materialistic level in the two studies is attributed
to the sample difference of the studies. The samples of the study by Eastman et al. (1997) are collected from “Nan-da”, a university in a major city Nanjing; whereas the samples of the study by Schaefer et al. (2004) are collected from a high school in a suburban area in the Shanxi province, a less developed area of China.

The discussion above suggests that economic development may have an impact on materialism among Chinese people who have the same Confucian culture but are living in different regions at various stages of economic development. The results of a longitudinal and cross-sectional content analysis of print advertisement from Hong Kong, mainland China, and Taiwan support such observation as people in Hong Kong are most materialistic, follows by people in Taiwan (Tse et al., 1989). However, it should be noted that the study was conducted in mid 80’s when the mainland China was just at the early stage of the economic development. The rapid economic development in some major cities in China such as Shanghai and Beijing may increase the materialistic values of the population significantly in recent years.

2.6 Green Consumer Behaviour and Materialism in Hong Kong

Before going into further details of this study, it is prudent to review the research work on green consumer behaviour and materialism in Hong Kong. The earlier research work on green consumer behaviour in Hong Kong starts in the 90’s (Chan, 1993; Chung and Poon, 1994; Chan and Yam, 1995; Chan, 1996; Chung and Poon, 1996). Based on socio-demographic characteristics
to profile the green consumers, it is concluded that education level is the only significant variable to differentiate the green and the non-green consumers (Chan, 1993). However, another study suggests that gender and household income are the significant factors for the differences (Chan, 1996). A study on segmentation of green consumer in Hong Kong supports that education and household income are useful demographic characteristics to segment the green consumers who also have a strong self-identity on green consumption (Chan, 1999a). More recently, Lee (2009) shows that there are gender differences in green purchasing behaviour among adolescent consumers in Hong Kong. The female adolescents have higher environmental attitude, environmental concern and green purchasing behaviour, but the male adolescents have a stronger self-identity for environmental protection. Wong and Wan (2009) confirm that gender, education level, environmental belief, and perceived government performance on environmental protection affects environmental concern. As indicated by the review mentioned above, the findings on the use of social-demographic characteristics for profiling green consumers in Hong Kong are equivocal.

From psychological aspects, Chan and Yam (1995) show that affect is more significant than knowledge in predicting the green consumer behaviour in Hong Kong, and therefore, recommend the government to rely more on emotional appeal than education to promote environmental behaviour. On the aspect of attitude-action gap of environmental protection, many consumers in Hong Kong do not turn their environmental concern into the action of purchasing green products (Yam-Tang and Chan, 1998). The attitude-action
gap on environmental protection still exists among undergraduate students in Hong Kong (Chung and Leung, 2007). This situation is similar to the research findings in other parts of the world (Kilbourne et al., 2009).

As indicated by the literature review, there are only limited research works on green consumer behaviour in Hong Kong. On the side of materialism, there are research works on materialism among adolescents in Hong Kong (Chan, 2003; Chan and Prendergast, 2007); however, there is no work on how materialism affects green consumer behaviour in Hong Kong. Therefore, the findings of this study would fill the knowledge gap in this area.

2.7 Conclusion
As one of the measures to save the earth, green marketing has experienced various stages of up and down development in the past few decades starting from the early 70’s. It starts with a poorly defined term, which falls in between the academic discipline of marketing and environment, and therefore does not receive much attention at the macro marketing level. The practicality and effectiveness of green marketing on environmental protection has also been challenged, as it is selling a public good inside a private good. However, the first mover advantage on green vehicle by Toyota provides strong support on green marketing. While eco-label and eco-advertisement are important communication channels between the green product producers and the green consumers; unfortunately, there are many abuses for short term benefits.
Consumer behaviour is crucial to success in green marketing. The theory of planned behaviour is commonly used to predict the intention of green consumer behaviour based on psychological variables such as environmental value, environmental attitude, environmental belief, and environmental concern. On the other hand, many researchers focus on characterization and profiling of the green consumers based on socio-demographic variables; however, their findings are equivocal. Although research in western societies is moving toward understanding the reasons for the green consumer behaviour from profiling the green consumers, there are recent studies on characterization and profiling green consumers in developing counties such as China and India. It is evidence that the questions of who are the green consumers, and why consumers purchase green products are still unanswered.

Materialism helps economic development, but sustainability cannot be met by unlimited economic growth. There is a debate on environmental concern and post-materialism, as less affluent societies have also expressed their environmental concerns. The materialism in developing countries is developed at different economic stages than that in the western societies provides an explanation for the difference. However, Hong Kong may be in another situation as it is a place where East meets West. With only a few research works done on green consumer behaviour in Hong Kong, it is worthwhile to study how materialism affects green consumers in Hong Kong.
Chapter 3   Research Method

3.1 Introduction
This chapter describes and explains the methods adopted for obtaining and analysis of the data to answer the research questions. It starts with a consideration of the broad research approach of positivism and interpretivism, follows by the selection of the detailed design of the research. It then addresses the issues on sampling, data collection, and data analysis. The scale measures for materialism, environmental beliefs, environmental concern and green consumer behaviour are discussed and justified. Lastly, it explains how the questionnaire is designed with particular attention given to the ethical aspects of the research.

3.2 Research Questions
The key research question for this study is how materialism affects green consumer behaviour in Hong Kong. Based on the theory of planned behaviour (Ajzen, 1991), four hypotheses are formulated to answer this general question.

1. Environmental beliefs affect the environmental concern of green consumers
2. Environmental concern affects the green consumer behaviour
3. Materialism has a negative moderation effect on environmental beliefs of green consumer
4. Materialism has a negative moderation effect on environmental concern of green consumer
These hypotheses are used to guide the selection of methods for this study. The first consideration is on the broad approach of positivism verses interpretivism.

### 3.3 Positivism and Interpretivism

The research question falls into the field of applied social psychology, and is related to the concept of material value and the green consumer behaviour. Positivism and interpretivism are two common approaches for conducting applied social research, and there are many discussions among researchers on these two approaches (Xie, 2005; Mingers, 2004; Weber, 2004; Walsham, 2001). Xie (2005) points out that the most obvious and significant difference among social researchers is on the methodology of social research; hence, it is important to address this particular dimension of social research at the beginning of this chapter.

The term positivism comes from the French philosopher Auguste Comte in the nineteen century when he establishes the scientific approach to study sociology (Carr et al., 2009). In essence, Comte considers that scientific knowledge should be used to study the facts and regularities of nature and society, and the pseudo explanation on facts and regularities provided by theological and metaphysical approach should be abandoned. Xie (2005) suggests that positivism has become the major acceptable approach in applied social research and remains as the best solution for understanding the societies with variability. However, many researchers in recent years have considered that positivism does not fit their research on understanding
human behaviour, and adopt another research approach of interpretivism in their studies (Walsham, 2001; Karami et al., 2006).

Interpretivism focuses on understanding the social phenomenon through the lens of the subjects under the research, as interpretivists believe that people are the key players in the social world. They therefore consider that the nature of reality in a society is the meanings and experiences of human beings, and it is not the world of nature that should be understood through objective measurement and survey (Williamson, 2006).

When the philosophy of positivism and interpretivism are applied to social research work, they become the commonly known quantitative method and qualitative method respectively. In quantitative method, the researcher and the reality is separate, the reality of the world is an objective matter that exists beyond the human mind, the inherent qualities of the subject is independent of the researcher, the data is primarily analysed by statistics that serve to test the validity and reliability of the data, and the test of the theory of true is based on the objective statistical findings from the data. In qualitative method, the researcher and the reality are not separate, as the reality of the world includes the researchers’ own experience. The meaning of the research object is interpreted with respect to the experience of the researcher through hermeneutics or phenomenological approach, the validity and reliability of the research is based on defensible knowledge claims and the researchers’ own awareness of the implication of their subjectivity, and the truth of the theory is based on a phenomenological approach (Weber, 2004).
From the perspective of application, quantitative method entails a deductive approach for testing of theories which aims to understand or explain a social reality objectively through collection and analysis of data obtained by measurement or survey. Qualitative method entails an inductive approach for generation of theories to understand a social reality through interpretation of meanings of the research objects with reference to the subjective experience of the researcher (Bryman, 2004).

For this particular research, the quantitative method is selected. It is because that the theories of consumer behaviour do exist (Ajzen, 1991), and therefore, it is not necessary to generate a theory through interpretivism. Furthermore, the aim of the research is to understand the effect of materialism on green consumer behaviour in a particular setting in Hong Kong in which the cultural difference may have an impact on both materialism and the green consumer behaviour. Therefore, a quantitative questionnaire is relevant for collecting data objectively from the sample to understand the effect of materialism on green consumer behaviour, and to test the validity of a planned behaviour model by quantitative method.
3.4 Research Design

3.4.1 Types of Research Design

This section examines different types of research design that are commonly used in quantitative research, such as experimental design, cross-sectional design, longitudinal design, case study, and comparative study, with a view to identifying the most relevant research design for this study.

Generally speaking, experimental design is used in quantitative analysis to study the causal impact between an independent variable and a dependent variable. Laboratory experiment is used in scientific study in which the variables are controllable in a laboratory. Field experience is more relevant for social science study, but it is difficult to control or manipulate the independent variable. In this study, it is very difficult to manipulate the independent variables such as environmental beliefs, environmental concern, or materialism of the subject. So, experimental design is not relevant to this study.

Longitudinal research design aims to study the subjects at more than one time and therefore is useful for studying the causal effect of independent variables on dependent variables. For example, following a sample of students over a time period of their schooling would allow a study of the effect of education on certain variables such as environmental concern or green consumer behaviour. However, it is time consuming and resources demanding to follow the subjects over a period of time. Therefore,
longitudinal research design is not commonly used in social study (Bryman, 2004). Although it is meaningful to find out how certain variables affect the change in green consumer behaviour longitudinally, unfortunately, it is beyond the practicality of a DBA dissertation which lasts for only a few months.

Case study entails detailed and intensive analysis of a single case, which can be a community, an organization, a family, a person, or an event. Comparative research design is commonly used for study of two or more similar cases to identify the commonality or difference. Both case study and comparative design are not applicable to this study as the purpose of this study does not fit into a single case for intensive analysis nor there are similar or contrasting cases for comparison.

Cross-sectional research design is a commonly used research design in social study; it entails the collection of data from more than one subject at a single point in time on two or more variables to identify the patterns of association such as causal relationship. The data are often collected through questionnaire or structured interview and the research design is also known as survey research (Bryman, 2004). This type of research design is widely used in marketing research and is relevant to this study because of the following reasons. First, the collection of data at a single point in time fits the time frame of the research within a few months. Second, the data is collected from more than one subject of the sample. Third, the pattern of association among the variables can be analysed by quantitative method. While the
collection and analysis of data from the sample are discussed in the following sections, it is expected that the pattern of association between environmental beliefs, environmental concern, materialism, and green consumer behaviour could be obtained through the statistical analysis of the data.

3.4.2 Reliability, Replication, and Validity of Research Design

Besides the various approaches of research design mentioned above, there are a few key issues that should be considered in selecting a research design. They are reliability, replication, and validity. A reliable research design means that the result of the research is repeatable. A replication of research means that anyone can follow the procedures described in a research report to repeat the research. Validity of a research refers to the integrity of the conclusions. Validity is the most important criteria of a research design and can be further sub-divided into four aspects, namely measurement validity, internal validity, external validity, and ecological validity.

Measurement validity is also known as construct validity, it addresses the question of whether the instrument is measuring the concept that it supposes to measure. Internal validity addresses the concern of how confident we are that the independent variable is at least partly explaining the variation of the dependent variable. External validity addresses the question of whether the findings of a research can be generalized beyond the context of the research. Ecological validity is concerned with the applicability of the findings in social science to the natural social setting of human beings. The internal validity is the most important consideration in this study as it is mainly related to the
issue of causal relationship among the variables under this study. Internal validity is generally weak in cross-sectional research design, as it is difficult to establish the causal relationship from the data (Bryman, 2004). Although cross-sectional research design is not good for studying casual relation when compared with longitudinal research design, it offers the advantage of obtaining the data within a short period of time. Therefore, it is selected for this study. However, the use of a better data analytical technique, such as the use of structure equation modelling to replace the use of multiple regression, can enhance the internal validity of the study (Frazier et al., 2004). This aspect is discussed further in section 3.8 below.

However, cross-sectional research design does product association among the variables under examination, and causal inference may be obtained through quantitative analysis of the data.

3.5 Sampling
Probability sampling is considered as a good practice in research as it provides random samples for analysis to satisfy the external validity requirement for generalization of the findings (Bryman, 2004). However, nonprobability sampling is also used in research work for various reasons, such as impossible or very difficult to obtain probability samples, constraints on time or cost of the research, and opportunity available to study a certain group of subjects.

A nonprobability sampling is adopted for this study. It is because that the
study is not only exploratory by nature, but it also aims to identify the range of responses on ideas and opinions of consumers. Although there are studies using probability sampling to examine green consumer behaviour (Kilbourne and Pickett, 2008; D’Souza et al., 2007; Fray and Martinez, 2006), there are many studies that use nonprobability sampling to investigate consumer behaviour (Kim and Choi, 2005; Straughan and Roberts, 1999). In order to reduce the bias in selecting a specific group of subjects for the study, two groups of students are selected, one is the full time undergraduate students from a tertiary education in Hong Kong, and the other is the part-time post-secondary students attending class in Hong Kong.

There are three commonly used nonprobability sampling, namely convenience sampling, snowball sampling, and quota sampling. Convenience sampling is the choice for this study. It is because that educational establishment and students are generally more willing to assist on research work, and it is easy and convenient to get access to a large number of potential participants in a classroom. The snowball sampling relies on referral of the selected subjects and is subject to bias introduced by the referral. The quota sampling allows the researcher to identify the strata of samples and the proportions they are represented in the population. This feature of quota sampling is not useful in this study.

Two hundred and twenty questionnaires were collected from the survey, in which four were incomplete with more than half of the questions unanswered. The overall return rate of the questionnaire is 58%. The high return rate is
attributed to the advanced communication with the instructors concerned on the detailed arrangement of the survey and the personal distribution of the questionnaire by the research student. The participants consist of both full time and part time post-secondary students in the field of business studies, science, and engineering in Hong Kong from offshore students of University of Newcastle, Australia, and University of Technology, Sydney, and the Baptist University.

3.6 Data Collection

Structured interview and self-completion questionnaire are two common methods to collect quantitative data for survey research in social science. The structured interview can take the form of in person interview or telephone interview; it can be conducted by a single interviewer or by many different interviewers with standardization training. The self-completion questionnaire can take many different forms too. It can be distributed by post, by e mail, or in person; and it can be returned by post, by using a drop box locating near the participants, by e mail, or by in person collection.

Comparing with self-completion questionnaire, the structured interview has the advantage that more open questions and questions that are not salient to the participants can be asked in the survey. It is because that the interviewer is there to help the participants understand the questions and probe the participants to elaborate on their answers. Furthermore, the interviewer can help ask questions that are not salient to the participants, ensure that the questions are answered in sequence, and know who answers the questions
even without any detailed personal information.

On the other hand, the disadvantages of the structured interview include the impact of attributes such as gender, age, social-economic status of the interviewer on the participants, the variation caused by the behaviour of the interviewer in prompting and probing the participants, and the time and cost involved in conducting the interview.

Self-completion questionnaire is easy to administer; it is cheaper than structured interview, and is quicker to conduct. Questionnaires that sent through e mail may get immediate responses. As there is no interviewer involved in the collection of data, self-completion questionnaire offers the advantages of no interviewer variability, no interviewer personal effect, and it is convenient to many participants. However, self-completion questionnaire method suffers from a low response rate, has a higher risk of missing data in the return, and does not allow many questions to be asked, in particular the questions that are not salient to the participants.

The self-completion questionnaire is chosen for this study. Time and cost are the primary reasons for the choice. In deciding on using either an electronic questionnaire or a paper questionnaire, considerations have been given to the response rate and on the reliability of knowing whether the questionnaire is filled out by the selected group of participants. Paper questionnaire is selected as it gives a higher response rate and it is less likely that the questionnaire is filled out by others. With the consent of the institutions and
the lecturers concerned, the paper questionnaires are distributed in class to
the potential participants and collected by the researcher in person.

3.7 Scale Measures

Environmental beliefs, environmental concern, materialism, and green
purchasing behaviour are primary variables to be measured in this study.
These variables are abstract concept that commonly known as construct in
business research. This section examines the key issues that need to be
considered in selecting or developing the relevant scales for the
measurement, they include validity, reliability, and practicality of a
measurement, different types of scale measures, and criteria for selection or
developing scale measures.

3.7.1 Validity of Scale

Validity of measurement has different dimensions. External validity answers
the question whether the findings from the measurement of the research
study can be generalized. The internal validity concerns with the ability of the
instrument to measure what it supposes to measure under the research
design. Within internal validity, there are three major dimensions that need to
be addressed; they are content validity, criterion-related validity, and
construct validity (Cooper and Schindler, 2006). The external validity and the
internal validity of the scale measures are further discussed in the following
sections.

The external validity relates to sampling and data collection, and these two
issues are discussed in earlier sections. In brief, a nonprobability convenience sampling approach is adopted for this study. Such a sampling technique is not as good as a random sampling approach for obtaining representative samples for generalization of the findings. However, for the purpose of an exploratory study with limited time and resources, the findings of the study would provide an insight on the effect of materialism on green consumer behaviour among students in Hong Kong. With regards to data collection, self-completion questionnaires are distributed and collected by the researcher in person, and therefore, the collected data should be reliable.

The content validity of a measurement instrument addresses whether the measurement covers all aspects of the research questions. The content validity is usually a judgement of the researcher, sometimes with the help of a panel to assist the judgement. The criterion-related validity means that the researcher should consider whether the criterion of the measurement is relevant, freedom from bias, reliable and available. The third internal validity dimension is the construct validity. It aims to answer the question of what accounts for the variance in the measurement, and attempts to identify the underlying construct being measured. The approach to address the internal validity in this study is to identify and assess the scale measurements that have successfully been used in previous similar studies and adopt the most suitable scale measures.

Besides validity, scale measurement must be reliable. Otherwise, it renders the validity of the scale measurement useless. A reliable scale measurement
means that the scale would provide consistent results in measurement of the construct. There are three dimensions for considering whether the results are consistent; they are stability, equivalence, and internal consistency. Stability concerns whether the results obtained from the scale on repeated measures of the same person are consistent. Equivalence is concerned with the variations of results among different researchers on the same events. Internal consistency is a measurement using specialized correlation formulas to test the homogeneity among the items of a scale. Among all three concerns, the internal consistency is the only one that can be assessed by data analysis. In data analysis, Cronbach’s alpha value is commonly used for determination of the internal consistency of a scale, and the Cronbach’s alpha values are calculated in the data analysis of this study.

Practicality is an operational rather than scientific requirement of a measurement scale. Sometimes a balance needs to be made by the researcher to address the contradictory requirements of validity and practicality of measurement. There are two important dimensions of practicality; they are economy, and convenience. Economy means that the measurement scale is not lengthy and the method of data collection is cost effective. For instance, self-completion questionnaire is a more cost effective method than personal interview to obtain the information. A lengthy questionnaire would collect more information about the subjects but it is time consuming to both the researcher and the subjects in using the measurement scale. Convenience means that the measurement scale can be administered easily. A proper design questionnaire with simple sentences and clear
instructions is easier to administer than a personal interview. With respect to the discussion above on the validity, reliability, and practicality of scale measures, the following sections describe and explain how the scale measures used in this study are selected.

### 3.7.2 Materialism

There are two different approaches for measuring material value in research. One is based on the assumption that materialism relates to personal trait, and therefore one should measure materialism with respect to three specific personality traits, namely possessiveness, nongenerosity, and envy (Belk, 1984). In this approach, materialism is defined as “the importance a consumer attaches to worldly possessions,” and such possession has a central place in one’s life and provides the greatest source of satisfaction or dissatisfaction. This scale has several limitations, such as inconsistence, and low scale reliability (Richins and Dawson, 1992), and over estimation of the relationship between satisfaction and materialism (Solberg et al. (2004) in Robert and Clement, 2007).

The other approach for measuring materialism is based on treating materialism as a value (Richins and Dawson, 1992). The underlying assumption of this approach is that value guides one’s choices and conduct on many situations that include the consumption arenas. There are three domains under this value that are significant in the scale developed by Richins and Dawson (1992). They are acquisition centrality, possession-defined success, and acquisition as the pursuit of happiness.
Originally, the scale has eighteen items to cover all three domains mentioned above under three subscales. The scale has been used by many studies and has shown high internal reliability (Richins, 1994; Ryan and Dziurawiec, 2001). However, a cross-cultural study suggests that the scale works well in Denmark, but not very well in French and Russia (Griffin et al., 2004). Later on, a fifteen items new scale that possesses better dimension properties than the original scale was developed (Richins, 2004). In the same study, Richins (2004) conclude that a short form of the new material value scale containing only nine items also possesses the acceptable psychometric properties for measurement of materialism. Both the new scale and its short form have been used in recent studies (Roberts and Clement, 2007; Kilbourne and Pickett, 2008). The short form of nine items has also successfully been used in a cross-cultural examination of the relationship between materialism and individual values in Canada, Germany and the US (Kilbourne et al., 2005).

Therefore, despite that the original scale of material value developed by Richins and Dawson (1992) does not show promising results in French and Russia in the study by Griffin et al. (2004), the new scale developed by Richins (2004) was chosen for this study with the following reasons. First, the scale has successfully been used in Denmark (Griffin et al., 2004), and its short form has successfully been used in Canada and Germany (Kilbourne et al., 2005). Second, the scale by Richins and Dawson (1992) treats materialism as a value, and this is in line with the value-beliefs-norms theory adopted in this study. Third, the scale has a higher reliability than the other scale by Belk (1984).
The new fifteen items scale developed by Richins (2004) consists of three major value domains of materialism, and it has a nine items short form. The items are grouped into three subscales of success, centrality, and happiness as shown below. The symbol (R) at the end of the item donates that it is reverse scaled, and the symbol (S) identifies that the item would remain in the nine items short form. After a careful examination of each item, it is considered that the nine items material value scale should be used in this study. First, there is a tendency to reduce the number of items in a scale so that the subjects can focus on the remaining items. Second, some of the items in the fifteen items scale are phrased in conditional sentence structure that may be misinterpreted by the subjects when they are not focusing in completing the questionnaire. Third, the nine items scale has successfully been used by Kilbourne and Pickett (2008).

Items of the Success Subscale
1. I admire people who own expensive homes, cars, and clothes. (S)
2. Some of the most important achievements in life include acquiring material possessions.
3. I don’t place much emphasis on the amount of material objects people own as a sign of success. (R)
4. The things I own say I lot about how well I’m doing in life. (S)
5. I like to own things that impress people. (S)

Items of the Centrality Subscale
6. I try to keep my life simple, as far as possessions are concerned. (R) (S)
7. The things I own aren’t all that important to me. (R)
8. Buying things gives me a lot of pleasure. (S)
9. I like a lot of luxury in my life. (S)
10. I put less emphasis on material things than most people I know. (R)

Items of the Happiness Subscale
11. I have all the things I really need to enjoy life. (R)
12. My life would be better if I owned certain things I don’t have. (S)
13. I wouldn’t be any happier if I owned nicer things. (R)
14. I’d be happier if I could afford to buy more things. (S)
15. It sometimes bothers me quite a bit that I can’t afford to buy all the things I’d like. (S)

3.7.3 Environmental Beliefs

Environmental beliefs are commonly measured construct in studying of the environmentally friendly behaviour of consumers. It has been measured for more than three decades since environmental protection started receiving attention by the public and the researchers in the seventies (Kilbourne and Pickett, 2008; Fraj and Martinez, 2006; Dunlap and Van Liere, 1978; Maloney et al., 1975). In reviewing environmental value, Dietz et al. (2005) clarifies the concept of value, beliefs and attitude. In brief, values are concepts about desirable end states or behaviour that transcend specific situation and guide decision making when there are conflicts in our preferences. Beliefs are understandings of the state of the world based on one’s perception of facts, and general beliefs become worldviews. Attitudes are evaluations of specific
situations with a positive or negative opinion. The clarification of these concepts helps select the measurement scale for environmental beliefs.

Two basic measurement scales of environmental beliefs have been developed and used in studying of environmentally conscious behaviour. One is the so called “M & W” scale (Maloney et al., 1975), and the other one is the “New Ecological Paradigm” scale (Dunlap et al., 2000). The “M&W” scale has 128 items when it was firstly developed in 1973, and the short form developed in 1975 has four subscales, ten items for verbal commitment, ten items for actual commitment, ten items for affect, and fifteen items for knowledge. Verbal commitment refers to a person's statement on what he is willing to act for the environment. Actual commitment refers to one's statement on what he has done for the environment. Affect refers one's degree of emotionality for the environment. Knowledge refers to the specific knowledge related to environmental issues. Among the four subscales, the affect subscale is the one that closely relates to environmental beliefs.

The “New Ecological Paradigm” scale was firstly developed by Dunlap and Van Liere (1978) as the “New Environmental Paradigm” scale with twelve items to measure environmental beliefs and concern. It was an early attempt to measure environmental concern with a specific scale to replace the dominant social paradigm that included environmental concern. The “New Environmental Paradigm” scale was later modified to include items that cover a wider perspective of ecological concern rather than localized environmental issues by fifteen questions on a five point Likert scale (Dunlap et al., 2000).
Both the New Environmental Paradigm scale and the New Ecological Paradigm scale have become the most commonly used scale for measuring environmental concern on a global basis (Dunlap, 2008). However, neither the “M&W” scale nor the “New Ecological Paradigm” scale is used in this study. Instead, a scale for measuring environmental beliefs in a study (Kilbourne and Pickett, 2008) similar to the present study is selected for further consideration for use in this study.

This environmental beliefs scale is derived from earlier work of Cotgrove (1982) and Kilbourne et al. (2002). Kilbourne et al. (2002) consider that dominant social paradigm, in addition to ecological problems, ecological concern, and ecological condition, has a significant impact on environmental attitudes in affecting the willingness to change in environmental behaviour. They argue that the “New Ecological Paradigm” scale does not provide conceptualization of its dimension, and point out that environmental issue should be studied at the paradigm level which deals with the most fundamental issues of the problem. After re-examination of the items of the different scales mentioned above, the scale used by Kilbourne and Pickett (2008) was chosen for use in this study for the following additional reasons.

a. The scale has seven items, which has two items less than the other scale.
b. The coverage of the scale includes many items that are familiar to the people in Hong Kong. For instance, it covers global warming, ozone depletion, shortage of clean water, continuous use of chemicals, and rising and dangerous level of pollution.
c. The scale does not have negatively worded statement.
d. As one of the purposes of this study is to duplicate a similar study of Kilbourne and Pickett (2008) in Hong Kong under a different cultural environment, the use of the same scale adopted in the study by Kilbourne and Pickett (2008) would make the comparison of the findings more meaningful.

The seven items of the scale for measurement of environmental beliefs are:
1. Many types of pollution are rising to dangerous levels
2. Some living things are being threatened with extinction
3. Continued use of chemicals in agriculture will damage the environment
4. Shortages of some important resources will occur in the near future
5. Global warming is becoming a problem
6. Ozone depletion is an environmental problem
7. The availability of clean water will become a problem in the future

3.7.4 Environmental Concern
Environmental concern in this study refers to what actions and how these actions need to be done to save the environment after one has perceived the facts of the environment. It slightly differs from the environmental concern that is measured by the “New Ecological Paradigm” scale, which is more related to the term environmental beliefs. In other words, the concept of environmental concern here is closely related to the concept of environmental norms in the value-beliefs-norms theory of environmentalism explained by Dietz et al. (2005), in which norms means “ought to” statement. An example of environmental beliefs and environmental norms is that when one has environmental beliefs that natural resource is limited, one ought to save
energy; and then one should be concerned how energy is saved.

As the scale for measurement of environmental concern is not very well defined, the same scale of environmental concern used in the study of Kilbourne and Pickett (2008) was used in this study, so that the results of these two studies can be compared more easily. The scale has six items which measure the environmental concern on individual level, abuse of the environment, individual commitment on limiting consumption, political change, social change, and law enforcement. The specific items are:

1. I am very concerned about the environment.
2. Humans are severely abusing the environment.
3. I would be willing to reduce my consumption to help protect the environment.
4. Major political change is necessary to protect the natural environment.
5. Major social changes are necessary to protect the natural environment.
6. Anti-pollution laws should be enforced more strongly.

3.7.5 Green Purchasing Behaviour

The scale used for measuring green consumer behaviour in this study is a five items scale adopted from a recent study by Kim and Choi (2005). There are several reasons for not selecting the scale used in the Kilbourne and Pickett (2008)’s study for measuring environmental behaviour. First, the scale includes two subscales of direct behaviour and indirect behaviour. When the items for indirect green consumer behaviour are excluded, only four items are left. Second, there is an item on buying organic food. Although the
consumption of organic food is commonly considered as green consumer behaviour, however, the purpose of buying organic food may be on personal health ground rather than for social and environmental benefit. If this item is deleted, only three items are left.

On the other hand, the scale that has successfully been used by Kim and Choi (2005) has five items of green consumer behaviour that cover the purchase decision of many general goods. So, the green purchasing behaviour measured by this scale was used in this study to represent the green consumer behaviour. The items of the scale are shown below.

1. I make a special effort to buy paper and plastic products that are made from recycled materials.
2. I have switched products for ecological reasons.
3. When I have a choice between equal products, I purchase the one less harmful to other people and the environment.
4. I make a special effort to buy household chemicals such as detergents and cleansing solutions that are environmentally friendly.
5. I have avoided buying a product because it had potentially harmful environmental effects.

3.8 Analysis
The data collected from the questionnaire survey was analysed by using the SPSS 15 statistics package that includes AMOS 7.0 for the structure equation modelling. First, descriptive statistics were conducted for data screening, data distribution, demographic characteristics of the participants, and the distribution of the latent constructs. The reliability analysis using
Cronbach’s alpha was then conducted to test the internal consistency of the scales used to measure the constructs.

Factor analysis is a commonly used statistic technique for examining how the responses to the measured variables are influenced by the latent construct. It consists of two basic methods, one is exploratory factor analysis, and the other is confirmatory factor analysis (DeCoster, 1998). Exploratory factor analysis aims to discover the nature or the factors of the construct influencing the responses. Confirmatory factor analysis aims to confirm whether the constructs under investigation are influencing the responses as predicted by the hypothesis. Both exploratory factor analysis and confirmatory factor analysis were used in this study.

There are two common factoring methods in exploratory factor analysis, one is principal axis factoring and the other is principal component factoring. The former is primarily used for identifying the major factors of the construct that explain the variance of the responses, and the later is primarily used for reducing the number of items of the construct for maintaining the validity of the measurement (Leech et al., 2008). In this study, principal axis factoring was used to identify the common factors and the items that load on to the common factors of the materialism scale. Confirmatory factor analysis was used to test whether the observed item variables fits the hypothesized model of relations among the constructs. There are two different approaches to fit the model, one is multiple regression analysis, and the other is structural equation modelling. In this study, structural equation modelling by the
software AMOS 7.0 was used for the confirmatory factor analysis to confirm how the observed variables of the common factors of materialism affect the latent construct.

The analysis of the mediator effect of environmental concern and the moderator effect of materialism is based on the concept of mediation and moderator explained by Baron and Kenny (1986). There are two different techniques available for the actual analysis of the mediator effect and the moderator effect, one by multiple regression analysis and the other by structural equation modelling (Frazier et al., 2004; Holmbeck, 1997). The advantage of multiple regression analysis is that it is available in most statistic packages and therefore it is easily accessible to students and researchers. However, multiple regression technique for moderator analysis suffers from the disadvantage of low power of test of the product term, which is the key consideration of whether a moderator effect exists (Frazier et al., 2004). It is also affected by sample size, especially when the effect of the interaction between the predictor and the moderator, the product term, is small. The disadvantages of low power and large sample size requirement are also relevant to the use of multiple regression analysis for analysis of mediator effect (Frazier et al., 2004).

On the other hand, the structural equation modelling technique offers the advantages of controlling unreliability in measurement, applicable to studies involving interactions of both categorical and continuous variables, and using path constrained in model fitting. It can also control measurement error,
provide information on model fit, and is therefore more flexible than multiple regression technique (Frazier et al., 2004). However, a sample of at least 200 is recommended for the use of structure equation modelling. So, multiple regression analysis becomes the only choice for mediator or moderator analysis when sufficient sample is difficult to obtain.

Given the advantages of the structural equation modelling mentioned above, and it is not difficult to obtain more than 200 samples from the student population, structural equation modelling was used for confirmatory factor analysis, mediator and moderator analysis in this study. Chi-square test with significant level, goodness of fit index (GFI), comparative fit index (CFI), and root mean squared error of approximation (RMSEA) were used to assess the model fit.

3.9 Questionnaire Design
Questionnaire is a common tool in social science and business research to collect data from the subjects for measurement of the constructs under investigation. However, designing a questionnaire is an important issue in a research which involves collection of attitude from the subjects. It is because that the questionnaire serves as a communication between the researcher and the subjects, and it is the only communication channel in the case of self-completion questionnaire, as in the case of this study.

The questionnaire has two parts. Part one is the survey information sheet which provides the background and purpose of the survey. It also contains a
clear statement that the participation in the survey is entirely voluntary, the complaint channels, and the contacts with the researchers. Part two is the survey in which the construct of materialism, environmental beliefs, environmental concern, and green consumer behaviour are measured by the scales discussed in the previous sections. It also contains two questions on the demographic information of the participants, one on gender and the other one on age. It is purposely to limit the demographic information to a minimum to reduce the time for completion the questionnaire. It is anticipated that the average time for completion of the questionnaire is 15 minutes. Lastly, space is provided for the respondents to place comments on the questionnaire.

In the questionnaire, seven point Likert scales are used for all measurements. Likert scale, developed by Rensis Likert in 1932, is a one dimensional scale commonly used in social research to collect the opinion of the subjects. It is considered as a variation of summated rating scales which contain statements for the subjects to express their attitude with a score for analysis (Cooper and Schindler, 2006). Although Likert scale is often used in social studies, there are two issues on Likert scale that need to be considered for this research. First, would the cultural difference in Hong Kong affect the use of the Likert scale? Second, what is the number of the response choice that should be used?

The question of whether the Likert scale is culturally biased was raised by Flaskerud (1988) when she experienced difficulty in applying the Likert scale with the subjects of Vietnamese and Central Americans. However, a recent
study in the United States on self-identified Chinese, Japanese and Americans concludes that there is little evidence of differences among the educated Chinese, Japanese, and Americans on the use of Likert scale on health and coherence (Lee et al., 2002). This finding provides some support on the use of Likert scale in Hong Kong.

On the number of choices in the Likert scale, a study in Hong Kong concludes that the Chinese participants do not show any differences in responding to questionnaires with even or odd number of choices (Wong et al., 1993). As seven point Likert scale measurements are used in the previous studies (Kilbourne and Pickett, 2008; Kim and Choi, 2005) from which the measure scales are adopted, and there are successful application of seven point Likert scale consumer research in Hong Kong (Lam and Zhang, 1999; Chow 1998), it is therefore prudent to use seven point Likert scale in this study to facilitate the comparison of the findings.

3.10 Ethics Consideration
As this research involves humans, ethics consideration is an important element of the research work. In this aspect, the ethics application to the Human Research Ethics Committee of the University of Newcastle provides a good guidance for consideration of the various dimensions of the ethics issues relating to the proposed research work. The ethical issues include the communications with the subjects, the voluntary participation of the subjects, the anonymousity of the participants, the age of the subjects, the psychological impact to the participants, the restricted use and the security of
the data collected etc. The questionnaire survey of this research work commenced after the approval was given by the Human Research Ethics Committee of the University.

3.11 Conclusions

A positivism approach of quantitative method was used to study how materialism affects green consumer behaviour in Hong Kong. Based on Ajzen’s (1991) theory of planned theory, a model hypothesized that environmental concern is a mediator of environmental beliefs and green purchasing behaviour is built for testing. Furthermore, the moderation effect of materialism on the relation between environmental beliefs and environmental concern; and between environmental concern and green purchasing behaviour were tested by structural equation modelling using AMOS.

A cross-sectional research design with self-completion questionnaires were used for collection of data from a convenience sample of full time and part-time post-secondary students in Hong Kong. The questionnaire was designed to facilitate the communication between the researcher and the subjects for the purpose of collecting the necessary data. As the research involves humans, the research work commenced after approval was obtained from the Human Research Ethics committee of the University of Newcastle. The research student of this study administers the distribution and collection of the questionnaires by himself.
The instrument for collecting the data included scales for measurement of the materialism, environmental beliefs, environmental concern, and green purchasing behaviour. A seven point Likert scale was applied to the measure scales. All the scales have successfully been used in previous studies (Kilbourne and Pickett, 2008; Kim and Choi, 2005).

The SPSS statistic package was used for the analysis. Descriptive statistics were conducted for data screening, data distribution, and overview of the responses to the scale measurements. Cronbach’s alpha was used to test the internal consistency of the constructs. Exploratory factor analysis using principal axis factoring was used to confirm the items in each scale are representing the construct being measured. Confirmatory factor analysis was used to test whether the observed item variables fits the hypothesized model of relations among the constructs. Structural equation modelling was used for testing the mediator effect of environmental concern, and the moderator effect of materialism. Chi-square test with significant level, goodness of fit index (GFI), comparative fit index (CFI), and root mean squared error of approximation (RMSEA) were used to assess the model fit.
4.1 Introduction

This chapter presents the analysis of the data obtained from the questionnaire survey conducted during the period of September to October 2009 in Hong Kong. It has eight sections. The first section is introduction. The second section presents data screening and descriptive statistics. The third section examines scale reliability and validity. The fourth section presents the exploratory factor analysis of the materialism scale for the purpose of identification of subscales with sufficient internal reliability for further analysis. The fifth section presents the confirmatory analysis of the materialism scale by structural equation modelling. The sixth section presents the analysis of mediator effect of environmental concern on environmental beliefs and the green purchasing behaviour. The seventh section presents the analysis of moderator effect of materialism on green purchasing behaviour. The final section summarizes the findings of the data analysis.

4.2 Data Screening and Descriptive Statistics

First, the results of data screening confirm that there is no missing data in the data file. In order to minimize the collection of unnecessary personal data, only two demographic characteristics of the participants are collected, they are gender and age. The demographics of the participants are shown in Table 4.1. About 78% of the participants are aged between 18 and 35. The overall female participant is 55%, and the male participant is 45%. 

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The mean of the average scores of all items of each scale are listed in Table 4.2 with a breakdown on gender and age group. A cut-off age of 35 is adopted for the young generation and the mature population. The age of 35, rather than 45, is adopted so that the percentage of sample in the mature group is not very small. About 78% of the participants belong to the young generation, and 22% belong to the mature group.

<table>
<thead>
<tr>
<th>Demographics of Participants</th>
<th>Gender</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>Male</td>
<td>Female</td>
</tr>
<tr>
<td>Age 18 to 25</td>
<td>Count</td>
<td>28</td>
</tr>
<tr>
<td>% of Total</td>
<td>13.0%</td>
<td>30.1%</td>
</tr>
<tr>
<td>Age 26 to 35</td>
<td>Count</td>
<td>43</td>
</tr>
<tr>
<td>% of Total</td>
<td>19.9%</td>
<td>15.3%</td>
</tr>
<tr>
<td>Age 36 to 45</td>
<td>Count</td>
<td>21</td>
</tr>
<tr>
<td>% of Total</td>
<td>9.7%</td>
<td>7.4%</td>
</tr>
<tr>
<td>Age 46 to 55</td>
<td>Count</td>
<td>5</td>
</tr>
<tr>
<td>% of Total</td>
<td>2.3%</td>
<td>1.4%</td>
</tr>
<tr>
<td>Over Age 55</td>
<td>Count</td>
<td>0</td>
</tr>
<tr>
<td>% of Total</td>
<td>.0%</td>
<td>.9%</td>
</tr>
<tr>
<td>Total Count</td>
<td>97</td>
<td>119</td>
</tr>
<tr>
<td>% of Total</td>
<td>44.9%</td>
<td>55.1%</td>
</tr>
</tbody>
</table>
The results in Table 4.2 above show that there may be differences in materialism and green purchasing behaviour in different gender or different age group. Therefore, a t-test is used to compare the means. Table 4.3 and Table 4.4 show the comparison on gender differences. The Levene’s test in Table 4.4 on materialism has a significant value of .011 < .05, so equal variances is not assumed. The two tailed significant value of .176 indicates p > .05 and is not significant. Therefore, the means of materialism between male and female do not have significant difference, t (212.7) =1.36, p>.05. On
green purchasing behaviour, the Levene’s test has a probability greater than .05, so equal variances are assumed. The two tailed significant value of .718 indicates $p > .05$ and is not significant. Therefore, the means of green purchasing behaviour between male and female do not have significant difference, $t (214) = .36, p > .05$. Overall, there is no difference on materialism and green purchasing behaviour between the male and female participants.

<table>
<thead>
<tr>
<th>Construct</th>
<th>Gender</th>
<th>N</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Std. Error Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Materialism</td>
<td>Male</td>
<td>97</td>
<td>3.9966</td>
<td>.60994</td>
<td>.06193</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>119</td>
<td>4.1279</td>
<td>.81144</td>
<td>.07438</td>
</tr>
<tr>
<td>Green Purchasing Behaviour</td>
<td>Male</td>
<td>97</td>
<td>4.9732</td>
<td>1.03224</td>
<td>.10481</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>119</td>
<td>4.9210</td>
<td>1.07490</td>
<td>.09854</td>
</tr>
</tbody>
</table>

Table 4.4 Gender Group Independent Samples Test on Materialism and Green Purchasing Behaviour

<table>
<thead>
<tr>
<th>Construct</th>
<th>Levene's Test for Equality of Variances</th>
<th>t-test for Equality of Means</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>F</td>
<td>Sig.</td>
</tr>
<tr>
<td>Materialism</td>
<td>.108</td>
<td>.743</td>
</tr>
<tr>
<td></td>
<td>.108</td>
<td>.743</td>
</tr>
</tbody>
</table>

EVA: Equal variances assumed; EVNA: Equal variances not assumed
It is difficult to explain the level of materialism with limited data in a cross sectional study. The sample is a mixture of both full-time and part-time post-secondary students and it can represent a middle class of Hong Kong people. However, the data cannot tell whether there is any change in materialistic value over a time period, but the two major economic downturns in Hong Kong during the last decade may lower the materialistic value of people in Hong Kong. It is because that economic development does affect materialistic values in Chinese societies (Tse et al., 1989). On the other hand, under the Chinese culture of man-himself orientation, people may be conservative in expression oneself and thus leading to a lower materialistic value in the study. However, there is no evidence under this study to link this dimension of Chinese culture to the materialistic value of the sample.

Tables 4.5 and Table 4.6 show the comparison on age group. The Levene’s test in Table 4.6 on materialism has a significant value of .055 > .05, so equal variances is assumed. The two tailed significant value of .011 indicates p < .05 and is significant. Therefore, the means of materialism between different age group have a significant difference, t (214) = 2.58, p <.05. This means that the younger generation has a different materialism value than the mature group. On green purchasing behaviour, the Levene’s test has a probability greater than .05, so equal variances are assumed. The two tailed significant value of .829 indicates p > .05 and is not significant. Therefore, the means of green purchasing behaviour between different age group do not have significant difference, t (214) = .22, p>.05. This means that, despite the young generation has a higher materialistic value than the mature population, there
is no significant difference between them on green purchasing behaviour.

Table 4.5 Age Group Statistics on Materialism and Green Purchasing Behaviour

<table>
<thead>
<tr>
<th>Construct</th>
<th>Age Group</th>
<th>N</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Std. Error Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Materialism</td>
<td>Young</td>
<td>169</td>
<td>4.1354</td>
<td>.74461</td>
<td>.05728</td>
</tr>
<tr>
<td></td>
<td>Mature</td>
<td>47</td>
<td>3.8298</td>
<td>.62117</td>
<td>.09061</td>
</tr>
<tr>
<td>Green Purchasing</td>
<td>Young</td>
<td>169</td>
<td>4.9527</td>
<td>1.01354</td>
<td>.07796</td>
</tr>
<tr>
<td>Behaviour</td>
<td>Mature</td>
<td>47</td>
<td>4.9149</td>
<td>1.19909</td>
<td>.17491</td>
</tr>
</tbody>
</table>

Table 4.6 Age Group Independent Samples Test on Materialism and Green Purchasing Behaviour

<table>
<thead>
<tr>
<th>Construct</th>
<th>Levene's Test for Equality of Variances</th>
<th>t-test for Equality of Means</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>F</td>
<td>Sig.</td>
</tr>
<tr>
<td>Materialism</td>
<td>EVA</td>
<td>3.712</td>
</tr>
<tr>
<td></td>
<td>EVNA</td>
<td>2.85</td>
</tr>
<tr>
<td>Green Purchasing</td>
<td>EVA</td>
<td>1.655</td>
</tr>
<tr>
<td>Behaviour</td>
<td>EVNA</td>
<td>.20</td>
</tr>
</tbody>
</table>

EVA: Equal variances assumed; EVNA: Equal variances not assumed
Further details about the data at the item level are provided in Table 4.7. They include the value of mean, standard deviation, skewness, and kurtosis of all items of each scale. The distribution shape of the data, measured by skewness, is an important issue as the bell shape normal distribution of the data is an assumption in many statistical analyses, such as ANOVA and regression (Innes, 2009). The results in Table 4.7 indicate that many items are negatively skewed with a negative statistic value far from zero. Whether these items are normally distributed could be determined by examining the skewness statistic and the standard error of the skewness (Innes, 2009). An acceptable approach is to consider whether the boundary of skewness statistic plus 2 times the standard error and the skewness minus 2 times the standard error contains the value of zero. If it does, this means that the 95% confidence interval contains the value zero, and the null hypothesis that the distribution is normal should not be rejected. Based on this approach, except items A2, A3, A6, and A7, all other items are skewed.

Kolmogorov-Smirnov test is another tool available in SPSS to test for normal distribution of data. The result of the test shown in Appendix I indicates that the data of all items are not normal distributed, as the two-tailed significant of the test statistic ($p<.001$) is smaller than the normal distribution at the $p < .05$ level (Hinton et al., 2004). Therefore, data transformation of variables is required to normalize the items before further analysis.
<table>
<thead>
<tr>
<th>Item No.</th>
<th>N</th>
<th>Mean</th>
<th>Std. Dev.</th>
<th>Skewness Statistic</th>
<th>Std. Error</th>
<th>Kurtosis Statistic</th>
<th>Std. Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>A1</td>
<td>216</td>
<td>4.31</td>
<td>1.599</td>
<td>-.448</td>
<td>.166</td>
<td>-.564</td>
<td>.330</td>
</tr>
<tr>
<td>A2</td>
<td>216</td>
<td>4.64</td>
<td>1.264</td>
<td>-.195</td>
<td>.166</td>
<td>.034</td>
<td>.330</td>
</tr>
<tr>
<td>A3</td>
<td>216</td>
<td>3.68</td>
<td>1.314</td>
<td>-.140</td>
<td>.166</td>
<td>-.255</td>
<td>.330</td>
</tr>
<tr>
<td>A4</td>
<td>216</td>
<td>3.12</td>
<td>1.600</td>
<td>.470</td>
<td>.166</td>
<td>-.723</td>
<td>.330</td>
</tr>
<tr>
<td>A5</td>
<td>216</td>
<td>3.09</td>
<td>1.376</td>
<td>.391</td>
<td>.166</td>
<td>-.338</td>
<td>.330</td>
</tr>
<tr>
<td>A6</td>
<td>216</td>
<td>4.38</td>
<td>1.432</td>
<td>-.077</td>
<td>.166</td>
<td>-.677</td>
<td>.330</td>
</tr>
<tr>
<td>A7</td>
<td>216</td>
<td>3.57</td>
<td>1.541</td>
<td>.240</td>
<td>.166</td>
<td>-.780</td>
<td>.330</td>
</tr>
<tr>
<td>A8</td>
<td>216</td>
<td>4.79</td>
<td>1.427</td>
<td>-.520</td>
<td>.166</td>
<td>-.086</td>
<td>.330</td>
</tr>
<tr>
<td>A9</td>
<td>216</td>
<td>5.05</td>
<td>1.475</td>
<td>-.994</td>
<td>.166</td>
<td>.781</td>
<td>.330</td>
</tr>
<tr>
<td>B1</td>
<td>216</td>
<td>5.90</td>
<td>1.097</td>
<td>-1.169</td>
<td>.166</td>
<td>1.541</td>
<td>.330</td>
</tr>
<tr>
<td>B2</td>
<td>216</td>
<td>5.81</td>
<td>1.123</td>
<td>-.514</td>
<td>.166</td>
<td>-.679</td>
<td>.330</td>
</tr>
<tr>
<td>B3</td>
<td>216</td>
<td>6.02</td>
<td>1.027</td>
<td>-1.060</td>
<td>.166</td>
<td>.965</td>
<td>.330</td>
</tr>
<tr>
<td>B4</td>
<td>216</td>
<td>5.96</td>
<td>1.147</td>
<td>-1.320</td>
<td>.166</td>
<td>2.353</td>
<td>.330</td>
</tr>
<tr>
<td>B5</td>
<td>216</td>
<td>6.30</td>
<td>.972</td>
<td>-1.361</td>
<td>.166</td>
<td>1.445</td>
<td>.330</td>
</tr>
<tr>
<td>B6</td>
<td>216</td>
<td>6.05</td>
<td>1.082</td>
<td>-1.072</td>
<td>.166</td>
<td>.530</td>
<td>.330</td>
</tr>
<tr>
<td>B7</td>
<td>216</td>
<td>5.99</td>
<td>1.034</td>
<td>-.771</td>
<td>.166</td>
<td>-.354</td>
<td>.330</td>
</tr>
<tr>
<td>C1</td>
<td>216</td>
<td>5.48</td>
<td>1.173</td>
<td>-.493</td>
<td>.166</td>
<td>-.371</td>
<td>.330</td>
</tr>
<tr>
<td>C2</td>
<td>216</td>
<td>5.70</td>
<td>1.077</td>
<td>-.593</td>
<td>.166</td>
<td>-.265</td>
<td>.330</td>
</tr>
<tr>
<td>C3</td>
<td>216</td>
<td>5.45</td>
<td>1.180</td>
<td>-.890</td>
<td>.166</td>
<td>1.252</td>
<td>.330</td>
</tr>
<tr>
<td>C4</td>
<td>216</td>
<td>5.74</td>
<td>1.204</td>
<td>-.958</td>
<td>.166</td>
<td>.645</td>
<td>.330</td>
</tr>
<tr>
<td>C5</td>
<td>216</td>
<td>5.87</td>
<td>1.117</td>
<td>-1.155</td>
<td>.166</td>
<td>1.731</td>
<td>.330</td>
</tr>
<tr>
<td>C6</td>
<td>216</td>
<td>6.00</td>
<td>1.072</td>
<td>-.810</td>
<td>.166</td>
<td>-.350</td>
<td>.330</td>
</tr>
<tr>
<td>D1</td>
<td>216</td>
<td>4.71</td>
<td>1.405</td>
<td>-.362</td>
<td>.166</td>
<td>.051</td>
<td>.330</td>
</tr>
<tr>
<td>D2</td>
<td>216</td>
<td>4.70</td>
<td>1.324</td>
<td>-.641</td>
<td>.166</td>
<td>.466</td>
<td>.330</td>
</tr>
<tr>
<td>D3</td>
<td>216</td>
<td>5.41</td>
<td>1.287</td>
<td>-.757</td>
<td>.166</td>
<td>.729</td>
<td>.330</td>
</tr>
<tr>
<td>D4</td>
<td>216</td>
<td>4.86</td>
<td>1.299</td>
<td>-.631</td>
<td>.166</td>
<td>.445</td>
<td>.330</td>
</tr>
<tr>
<td>D5</td>
<td>216</td>
<td>5.04</td>
<td>1.288</td>
<td>-.487</td>
<td>.166</td>
<td>.244</td>
<td>.330</td>
</tr>
</tbody>
</table>
The data of all items were normalized by transforming the data through either one of the following methods: square root, logarithmic, or inverse (Innes, 2009). The items of the environmental beliefs and the environmental concern scale were normalized by the procedure of “reflect, natural log, and further reflect”. The procedure of “reflect” is referred to the use of a large positive number to minus the score of the items to maintain all items score are positive but the order of the scores are reversed. The items of the green purchasing behaviour scale were also normalized by the procedure of “reflect, square root, and further reflect”. However, the materialism scale could not be normalized by any of the methods mentioned above. The descriptive statistic analysis on the skewness of the transformed items of environmental beliefs, environmental concern and green purchasing behaviour are shown in Appendix II. The result suggests that most of the transformed data are normalized when the criteria of the skewness statistic plus two times of its standard error and the skewness statistic minus two times of its standard error containing the zero value is accepted for a normal distribution of data (Innes, 2009).

4.3 Scale Reliability and Validity

Cronbach’s alpha is the parameter commonly used for the assessment of the reliability, also known as internal consistency, of the scales. It is particular useful when there are several items using Likert scale to measure the same scale and the scores of these items are summed to make a composite score or summated scale (Leech et al., 2008). The summated scale, rather than the individual items should be used for the analysis of the data; and the alpha
value provides an estimate of the reliability of the scale rather than the individual items (Gliem and Gliem, 2003). The alpha values for the materialism, environmental beliefs, environmental concern, and green purchasing behaviour scale are shown in Table 4.8. The value of alpha ranges from 0 to 1, with one indicating that all items load on the same latent construct. The general acceptable cut-off point for the alpha value is .7, but .6 may be acceptable (Garson, 2008). Except for the materialism scale, all other three scales have alpha values higher than 0.8. Therefore, it is concluded that these scales are reliable as they have high internal consistency. However, the alpha value of the materialism scale is on the low side. This indicates that the items of the materialism scale may load on different subscales.

Table 4.8 Reliability Statistics of the Scales

<table>
<thead>
<tr>
<th></th>
<th>Materialism</th>
<th>Environmental Beliefs</th>
<th>Environmental Concern</th>
<th>Green Purchasing Behaviour</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cronbach's Alpha</td>
<td>.630</td>
<td>.891</td>
<td>.847</td>
<td>.857</td>
</tr>
<tr>
<td>No. of Items in the Scale</td>
<td>9</td>
<td>7</td>
<td>6</td>
<td>5</td>
</tr>
</tbody>
</table>

A close examination of the inter-item correlation of the materialism scale, as shown in Table 4.9, reveals that the items are not strongly correlated. For instance, item A6 “The things I own aren't really that important to me” has a low correlation with seven other items with values less than 0.2. These item
correlation coefficients explain why the alpha value of the materialism scale is on the low side of .63 only. Therefore, an exploratory factor analysis on this scale is needed to have a better understanding of the items and the scale.

Scale validity is another concern in measurement of latent construct. Scale validity includes content validity, criterion-related validity and construct validity. Content validity reflects whether the scale measures the relevant content with sufficient coverage. Criterion-related validity concerns about whether the measurement predicts what is being measured against some well proven measurement. Construct validity concerns about whether the scale measures the latent construct as predicted by the underlying theory. The purpose of this study is not focused on the scale development, and it is considered that the scales adopted are valid for the study as they have been used successfully in many studies (Kilbourne and Pickett, 2008, Kim and Choi, 2005).
**Table 4.9 Inter-Item Correlation Matrix of Materialism Scale**

<table>
<thead>
<tr>
<th></th>
<th>A1</th>
<th>A2</th>
<th>A3</th>
<th>A4</th>
<th>A5</th>
<th>A6</th>
<th>A7</th>
<th>A8</th>
<th>A9</th>
</tr>
</thead>
<tbody>
<tr>
<td>A1</td>
<td>1</td>
<td>.659**</td>
<td>.125</td>
<td>.110</td>
<td>.180**</td>
<td>-.049</td>
<td>.138*</td>
<td>.287**</td>
<td>.412**</td>
</tr>
<tr>
<td>A2</td>
<td>1</td>
<td>1</td>
<td>.121</td>
<td>.007</td>
<td>.056</td>
<td>.008</td>
<td>.115</td>
<td>.219**</td>
<td>.303**</td>
</tr>
<tr>
<td>A3</td>
<td>1</td>
<td>1</td>
<td>.250**</td>
<td>.247**</td>
<td>.194**</td>
<td>-.050</td>
<td>.320**</td>
<td>.001</td>
<td>.123</td>
</tr>
<tr>
<td>A4</td>
<td>1</td>
<td>1</td>
<td>.591**</td>
<td>.025</td>
<td>1</td>
<td>-.050</td>
<td>.229**</td>
<td>-.110</td>
<td>-.020</td>
</tr>
<tr>
<td>A5</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>.272**</td>
<td>.000</td>
<td>.093</td>
</tr>
<tr>
<td>A6</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>.144*</td>
<td>.144**</td>
</tr>
<tr>
<td>A7</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

** Correlation is significant at the 0.01 level (2-tailed).
* Correlation is significant at the 0.05 level (2-tailed)

A1 I admire people who own expensive homes, cars, and clothes.
A2 Some of the most important achievements in life include acquiring material possessions.
A3 I don’t place much emphasis on the amount of material objects people own as a sign of success. (R)
A4 I usually buy only the things I need. (R)
A5 I try to keep my life simple, as far as possessions are concerned. (R)
A6 The things I own aren’t all that important to me. (R)
A7 I have all the things I really need to enjoy life. (R)
A8 My life would be better if I owned certain things I don’t have.
A9 I would be any happier if I owned nicer things.

### 4.4 Exploratory Factor Analysis of Materialism Scale

Exploratory factor analysis (EFA) is a statistical technique for a better understanding of the items that aim to measure a latent construct. It is now applied to validate whether the items of the scales are loaded onto a single latent construct. If they are not, it helps select the subsets of items that load on the subscales. The materialism scale has nine items and the results of the factor analysis by principal axis method indicate that they could be reduced to
three components with the following supportive details (Leech et al., 2008).

a. The determinant of the correlation matrix is 0.153 which is much higher than 0.0001, supporting that collinearity is not high.

b. The Kaiser-Meyer-Olkin measure of sampling adequacy is 0.643, indicating that there are sufficient items for each factor. The Bartlett's Test of Sphericity is 0.000, indicating that the correlation matrix is significantly different from an identical matrix (Table 4.10).

<table>
<thead>
<tr>
<th>Kaiser-Meyer-Olkin Measure of Sampling Adequacy</th>
<th>.643</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bartlett's Test of Sphericity</td>
<td>Approx. Chi-Square</td>
</tr>
<tr>
<td></td>
<td>df</td>
</tr>
<tr>
<td></td>
<td>Sig.</td>
</tr>
</tbody>
</table>

c. The cumulative % of the initial eigenvalues of the first three components is 61%, and the cumulative % of the rotation sums of squared loadings of the first three components is also 43.5% (Table 4.11). This means that 43.5% of the variance is explained by the first three components.

<table>
<thead>
<tr>
<th>Component</th>
<th>Initial Eigenvalues</th>
<th>Rotation Sums of Squared Loadings</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total Variance</td>
<td>% Cumulative</td>
</tr>
<tr>
<td>2</td>
<td>1.845</td>
<td>20.498</td>
</tr>
<tr>
<td>3</td>
<td>1.267</td>
<td>14.082</td>
</tr>
</tbody>
</table>

Extraction Method: Principal Axis Analysis.
d. The scree plot in Figure 4.1 supports that the first three components are most significant, as the eigenvalues for the remaining components are less than 1.0.

![Scree Plot of Materialism Scale](image_url)
e. The component plot in rotated space shows three components (Figure 4.2).

![Factor Plot in Rotated Factor Space](image)

**Figure 4.2 Component Plot in Rotated Space**

f. The rotated component matrix also supports the items cluster in the component plot are forming different groups with high factor loadings (Table 4.12).

As shown in Table 4.12, the principal axis analysis reveals that the materialism scale can be represented by three components, F1, F2 and F3. An exploration under the descriptive analysis shows that these components are normally distributed (Appendix III, Appendix IV).
### Table 4.12 Rotated Component Matrix of Materialism scale (a)

<table>
<thead>
<tr>
<th>Items of Materialism Scale</th>
<th>F1</th>
<th>F2</th>
<th>F3</th>
</tr>
</thead>
<tbody>
<tr>
<td>A.1 I Admire people who own expensive homes, cars, and clothes</td>
<td>.882</td>
<td>.227</td>
<td>-.087</td>
</tr>
<tr>
<td>A.2 Some of the most important achievements in life include acquiring possessions</td>
<td>.668</td>
<td>.079</td>
<td>-.005</td>
</tr>
<tr>
<td>A.3 I don't place much emphasis on the amount of material objects people own as a sign of success (R)</td>
<td>.105</td>
<td>.286</td>
<td>.406</td>
</tr>
<tr>
<td>A.4 I usually buy only the things I need (R)</td>
<td>-.051</td>
<td>.788</td>
<td>.066</td>
</tr>
<tr>
<td>A.5 I try to keep my life simple, as far as possessions are concerned (R)</td>
<td>.030</td>
<td>.725</td>
<td>.135</td>
</tr>
<tr>
<td>A.6 The things I own aren't really that important to me (R)</td>
<td>-.007</td>
<td>-.063</td>
<td>.490</td>
</tr>
<tr>
<td>A.7 I have all the things I really need to enjoy life (R)</td>
<td>.139</td>
<td>.249</td>
<td>.567</td>
</tr>
<tr>
<td>A.8 My life would be better if I owned certain things I don't have</td>
<td>.430</td>
<td>-.158</td>
<td>.115</td>
</tr>
<tr>
<td>A.9 I would be happier if I could afford to buy more things</td>
<td>.535</td>
<td>-.049</td>
<td>.208</td>
</tr>
</tbody>
</table>

Extraction Method: Principal Axis Analysis.
Rotation Method: Varimax with Kaiser Normalization.
a Rotation converged in 5 iterations.

Four items A1, A2, A8, and A9 load on F1. Two items A4 and A5 load on F2. Three items A3, A6, and A7 load on F3. Such loading arrangement is different from the loading arrangement of a previous study carried out in the United States (Kilbourne and Pickett, 2008), in which items A1, A2, and A3 load on one factor, A4, A5, and A6 load on another factor, and A7, A8, and A9 load on the third factor. Such difference may be attributed to the cultural difference on interpretation of the items and is further discussed in chapter five.
4. 5 Confirmatory Factor Analysis of Materialism Scale

Based on the findings of the exploratory factor analysis mentioned above, a confirmatory factor analysis (CFA) using AMOS was performed to analyse the materialism scale by model fitting. A model was successfully run with chi-square = 33.00, p = .081 > .05, GFI = .968 > .9, AGFI = .937 > .9, RMSEA = .045 < .050 (Figure 4.3). These values suggest that the proposed model is fit and therefore the null hypothesis is accepted. However, it is noted that the correlations between F1 and A8 and between F3 and A6 are lower than .4, indicating that these items are not closely related to the construct. Therefore, the items A6 and A8 were removed before running the analysis again to see if there is significant improvement on model fit.

A revised model without items A6 and A8 shows a better fitted model (Figure 4.4) with the following summary of model fit: chi-square = 10.08 (p = .523 > .05), GFI = .987 > .9, AGFI = .967 > .9, RMSEA = .00 < .05. The chi-square in the revised model is much smaller, reduced from 33.00 to 10.08, GFI and AGFI are larger and closer to 1, and RMSEA is reduced from .045 to .00. On the other hand, all the correlations between the items and the factors are higher than .4. Therefore, the exclusion of items A6 and A8 from the scale generates a better fitted model and this arrangement was adopted in all subsequent analyses.
Confirmatory Factor Analysis of Materialism Scale

CHI_SQUARE=33.000(P=.081)
DF=23; CMIN/DF=1.435
GFI=.968
RMSEA=.045; AGFI=.937

Figure 4.3 CFA on Materialism Scale
An examination of the covariances of the three factors of the materialism scale reveals that there are significant covariances among them, with critical ratio values higher than 1.96, p < .05 (Table 4.13). Although the correlations among the three factors are not very high (Table 4.14), a second-order CFA model was tested for the latent construct of materialism (LMAT).

Table 4.13 Covariances of Factors of Materialism Scale

<table>
<thead>
<tr>
<th></th>
<th>Estimate</th>
<th>S.E.</th>
<th>C.R.</th>
<th>P</th>
<th>Label</th>
</tr>
</thead>
<tbody>
<tr>
<td>F2 &lt;-&gt; F1</td>
<td>.340</td>
<td>.153</td>
<td>2.222</td>
<td>.026</td>
<td>par_2</td>
</tr>
<tr>
<td>F2 &lt;-&gt; F3</td>
<td>.482</td>
<td>.136</td>
<td>3.541</td>
<td>***</td>
<td>par_3</td>
</tr>
<tr>
<td>F1 &lt;-&gt; F3</td>
<td>.285</td>
<td>.123</td>
<td>2.315</td>
<td>.021</td>
<td>par_4</td>
</tr>
</tbody>
</table>

*** Correlation is significant at the 0.001 level (2-tailed)
Table 4.14 Correlations of Factors of Materialism Scale

<table>
<thead>
<tr>
<th>Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>F2 &lt;--&gt; F1</td>
</tr>
<tr>
<td>F2 &lt;--&gt; F3</td>
</tr>
<tr>
<td>F1 &lt;--&gt; F3</td>
</tr>
</tbody>
</table>

The result of the second order CFA is shown in Figure 4.5. The model is well fit with \( \text{chi-square} = 10.08 \) (\( p = .523 > .05 \)), GFI = .987 > .9, AGFI = .967 > .9, RMSEA = .00 < .05.

Confirmatory Factor Analysis of Materialism Scale

\[
\text{CHI\_SQUARE}=10.078(\text{P}=.523) \\
\text{DF}=11; \text{CMIN/DF}=9.16 \\
\text{GFI}=.987 \\
\text{RMSEA}=.00; \text{AGFI}=.967
\]
The second order confirmatory factor analysis supports the findings of the exploratory factor analysis that the materialism scale loads onto three major factors, and a better model fit is obtained after the removal of items A6 and A8 from the scale. F1 loads onto items A1, A2, and A9. F2 loads onto items A4 and A5. F3 loads onto items A3 and A7. The correlations between materialism and F1, F2, and F3 are .29, .65, and .86 respectively.

Following a detailed analysis of the scale, materialism has three components F1, F2, and F3. F1 has three items and is close to the dimension of acquisition happiness. F2 has two items and is close to the dimension of acquisition centrality. F3 has two items and is loosely related to possession-defined success.

4.6 Mediator Effect of Environmental Concern

4.6.1 Mediator effect means that a third variable, the mediator variable serves a function of facilitating the independent variable to influence the dependent variable (Baron and Kenny, 1986). In this study, it is hypothesized that environmental concern is a mediator for the relation between the predictor variable environmental beliefs and the dependent variable green purchasing behaviour, and the mediator relation is shown in Figure 4.6.
There are two methods for analysis of mediator effect, one is multiple regression analysis and the other is structural equation modelling (Frazier et al., 2004; Holmbeck, 1997). When there are multiple indicators for the latent variables under investigation, the structural equation modelling approach is preferred (Holmbeck, 1997).

There are four conditions that should be tested and satisfied for the confirmation of a mediator effect (Baron and Kenny, 1986). First, the predictor variable should be associated with the dependent variable significantly. Second, the predictor variable should be associated with the mediator variable significantly. Third, the mediator variable should be associated with the dependent variable significantly. Fourth, the mediator variable reduces the association between the predictor variable and the dependent variable significantly.
Structural Equation Modelling was used to test the mediator effect of the latent construct environmental concern (LEC) on the latent construct environmental beliefs (LEB) and the latent construct green purchasing behaviour (LGPB) in accordance to the requirements suggested by Baron and Kenny (1986) as mentioned above. First, the relation between environmental beliefs and green purchasing behaviour was tested by model fitting and model modification using the modification indices in the output of the model run. The modified model shown in Figure 4.7 is well fitted with the following summary: chi-square = 56.9 (p = .076 > .05), CMIN/DF = 1.32 < 3, GFI = .959 > .9, AGFI = .926 > .9, and RMSEA = .039 < .05. Therefore, the significant association between predictor variable environmental beliefs and the dependent variable green purchasing behaviour is established.
Relation between Environmental Beliefs and Green Purchasing Behaviour

CHI_SQUARE=56.912 (P=.076)
DF=43; CMIN/DF=1.324
GFI=.959
RMSEA=.039; AGFI=.926

Figure 4.7 Relations between Environmental Beliefs and Green Purchasing Behaviour

Second, the relation between the mediator variable environmental concern and the dependent variable green purchasing behaviour was tested. The modified model shown in Figure 4.8 is well fitted with the following summary:
chi-square = 42.9 (p = .198 > .05), CMIN/DF = 1.19 < 3, GFI = .965 > .9, AGFI = .936 > .9, and RMSEA = .030 < .05. Therefore, the significant association between mediator variable environmental concern and the dependent variable green purchasing behaviour is established.
Relation of Environmental Concern and Green Purchasing Behaviour

CHI_SQUARE=42.943(P=.198)
DF=36; CMIN/DF=1.193
GFI=.965
RMSEA=.030; AGFI=.936

Figure 4.8 Relations between Environmental Concern and Green Purchasing Behaviour

Third, the associations between the predictor variable and the mediator variable, and the association between the mediator variable and the dependent variable in the full model were tested. The modified model shown in Figure 4.9 is well fitted with the following summary: chi-square = 131.1 (p = .177 > .05), CMIN/DF = 1.12 < 3, GFI = .938 > .9, AGFI = .910 > .9, and
RMSEA = .024 < .05. Therefore, the significant associations between predictor variable and the mediator variable, and the mediator variable and the dependent variable in the full model are established. This means that environmental beliefs affects environmental concern, and environmental concern affects green purchasing behaviour.

Relation of Environmental Beliefs, Environmental Concern, and Green Purchasing Behaviour

CHI_SQUARE=131.065(P=.177)
DF=117; CMIN/DF=1.120
GFI=.938
RMSEA=.024; AGFI=.910

Figure 4.9 Full Model of Environmental Beliefs, Environmental Concern and Green Purchasing Behaviour
Lastly, the model of hypothesized environmental concern as the mediator variable was tested. The result of the test was obtained by modifying the original model with respect to the modification indices provided in the output of the model run, and the modified model shown in Figure 4.10 is well fitted with the following summary: chi-square = 129.9, (p = .178 > .05), CMIN/DF = 1.82 < 3, GFI = .939 > .9, AGFI = .910 > .9, RMSEA = .024 < .05. Comparing the chi-square value of 131.0 in the full model in Figure 4.9 with the chi-square of 129.9 in this mediator model, there is no significant difference. Furthermore, the direct correlation between environmental beliefs and the green purchasing behaviour is reduced from a value of .19 in the simple two variables model (Figure 4.7) to a value of -.14 in the mediator model (Figure 4.10). Therefore, it is confirmed that environmental concern has a total mediator effect on the relation between environmental beliefs and green purchasing behaviour as it removes the correlation between environmental beliefs and green purchasing behaviour completely (Holmbeck, 1997).
Mediator Effect of Environmental Concern

CHI_SQUARE=129.940(P=.178)
DF=116; CMIN/DF=1.120
GFI=.939
RMSEA=.024; CFI=.993

Figure 4.10 Mediator Model of Environmental Concern

As indirect effect has been reported as mediator effect by some researchers, it is important to confirm the significant direct association between the predictor variable and the dependent variable (Holmbeck, 1997). Figure 4.7 above shows that there is a significant association between environmental beliefs and green purchasing behaviour, and therefore the mediator effect identified in this study is not mistaken by the indirect effect.
4.7 Moderator Effect of Materialism

The analysis of the data in the previous sections has shown that environmental concern is a mediator between environmental beliefs and green purchasing behaviour, and that materialism loads on three factors. This section deals with the question whether materialism has a moderator effect on green purchasing behaviour. If it does, how it affects such behaviour. The analysis to test whether materialism has a moderator effect on green purchasing behaviour was conducted in three stages. The first analysis was on whether materialism has a moderator effect on environmental beliefs and environmental concern at the individual factor level. The second analysis was on whether materialism has a moderator effect on environmental concern and green purchasing behaviour at the individual factor level. The third analysis was on whether the overall materialism has a moderator effect on both environmental beliefs and environmental concern.

Before conducting the detailed analysis by structural equation modelling, the correlations among the scales of the constructs were analysed to provide a general situation of the variables (Table 4.15). The findings indicate that materialism has a negative effect on both environmental concern and green purchasing behaviour, but the correlations are not at a significant level.
Table 4.15 Correlations of Scale Measurements

<table>
<thead>
<tr>
<th></th>
<th>Materialism</th>
<th>Environmental Beliefs</th>
<th>Environmental Concern</th>
<th>Green Purchasing Behaviour</th>
</tr>
</thead>
<tbody>
<tr>
<td>Materialism</td>
<td>1</td>
<td>.070</td>
<td>-.041</td>
<td>-.113</td>
</tr>
<tr>
<td>Environmental Beliefs</td>
<td>Pearson</td>
<td>1</td>
<td>.609**</td>
<td>.213**</td>
</tr>
<tr>
<td>Environmental Concern</td>
<td>Pearson</td>
<td>1</td>
<td>1</td>
<td>.510**</td>
</tr>
<tr>
<td>Green Purchasing Behaviour</td>
<td>Pearson</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

** Correlation is significant at the 0.01 level (2-tailed).

The result of the model on moderator effect of materialism on environmental beliefs and environmental concern is shown in Figure 4.11. The model is successfully fitted with the following summary: chi-square = 11.70 (p = .069 > .05), CMIN/DF = 1.95 < 3, GFI = .987 > .9, CFI = .981 > .9, RMSEA = .066 < .08. The correlation of the model is shown in Table 4.16 which shows that the correlation between environmental beliefs and environmental concern (r = .608, p < .001), the correlation between factor 2 and environmental concern (r = -.142, p = .014 < .05), and the correlation between the product term of F2 times environmental beliefs and environmental concern (r = .152, p = .011 < .05) are significant. As the product term F2 times environmental beliefs is significant, it shows that the moderator effect of materialism is contributed by this factor.
Moderator Effect of Materialism on Environmental Beliefs

CHI-SQUARE=11.704, (p=.069)
CMIN/DF=1.951, DF=6
GFI=.987
RMSEA=.066, CFI=.981

Figure 4.11 Test of Moderator Effect of Materialism on Environmental Beliefs at Individual Factor Level

Table 4.16 Regression Weights of Figure 11 (Default model)

<table>
<thead>
<tr>
<th></th>
<th>Estimate</th>
<th>S.E.</th>
<th>C.R.</th>
<th>P</th>
<th>Label</th>
</tr>
</thead>
<tbody>
<tr>
<td>ZEC ← ZF2</td>
<td>-.142</td>
<td>.057</td>
<td>-2.467</td>
<td>.014</td>
<td>par_1</td>
</tr>
<tr>
<td>ZEC ← ZF1</td>
<td>-.029</td>
<td>.057</td>
<td>-.504</td>
<td>.615</td>
<td>par_2</td>
</tr>
<tr>
<td>ZEC ← ZF3</td>
<td>-.084</td>
<td>.058</td>
<td>-1.446</td>
<td>.148</td>
<td>par_3</td>
</tr>
<tr>
<td>ZEC ← ZEBxF1</td>
<td>.020</td>
<td>.054</td>
<td>.376</td>
<td>.707</td>
<td>par_4</td>
</tr>
<tr>
<td>ZEC ← ZEBxF3</td>
<td>-.040</td>
<td>.057</td>
<td>-.702</td>
<td>.482</td>
<td>par_5</td>
</tr>
<tr>
<td>ZEC ← ZEBxF2</td>
<td>.152</td>
<td>.059</td>
<td>2.559</td>
<td>.011</td>
<td>par_6</td>
</tr>
<tr>
<td>ZEC ← ZEB</td>
<td>.608</td>
<td>.051</td>
<td>11.952</td>
<td>***</td>
<td>par_22</td>
</tr>
</tbody>
</table>

*** Correlation is significant at the 0.001 level (2-tailed)

The result of the model on moderator effect of materialism on environmental concern and green purchasing behaviour is shown in Figure 4.12. The model
is fitted with the following summary: chi-square = 18.98 (p = .004 < .05), CMIN/DF = 3.16 > 3, GFI = .979 > .9, CFI = .941 > .9, RMSEA = 1.00 > .08. These results show that the model is not well fitted. The correlation of the model is shown in Table 4.17 which shows that the correlation between environmental beliefs and environmental concern (r = .50, p < .001), and the correlation between F2 and green purchasing behaviour (r = -.126, p = .042 < .05) are significant. As the correlations for the product terms are not significant, materialism does not have a moderator effect on green purchasing behaviour at the level between environmental concern and green purchasing behaviour.

Moderator Effect of Materialism on Environmental Concern

CHI-SQUARE=18.985, (p=.004)  
CMIN/DF=3.164, DF=6  
GFI=.979  
RMSEA=.100, CFI=.941

Figure 4.12 Test of Moderator Effect of Materialism on Environmental Concern at Individual Factor Level
The result of the model on the overall effect of materialism on green purchasing behaviour is shown in Figure 4.13 and Table 4.18. The model is successfully fitted with the following summary: chi-square = 2.37 (p=.668 > .05), CMIN/DF = .59 < 3, GFI = .996 > .9, CFI = 1.0 > .9, RMSEA = .00 < .08. There are two significant correlations in the model, environmental beliefs and environmental concern (r = .638, p < .001), and materialism and environmental concern (r = -.160, p < .001). However, the correlation between environmental concern and the green purchasing behaviour is not significant in this model (r = .163, p = .572 > .05). This suggests that the model is not reliable. Therefore, model fitting was performed again by adding the variables of materialism and the product terms one at a time to find a fitted model. A successfully fitted model is shown in Figure 4.14 and Table 4.19 with the following summary: chi-square = 1.58 (p= .81 > .05), CMIN/DF= .39 < 3, GFI = .977 > .9, CFI = 1.0 > .9, RMSEA = .00 < .08. This model shows that there are strong correlations between environmental beliefs and environmental concern (r = .638, p< .001), and environmental
concern and green purchasing behaviour ($r = .521$, $p < .001$); and materialism is negatively correlated with environmental concern ($r = -.170$, $p = .008 < .01$).

Moderation Effect of Materialism on Green Purchasing Behaviour

- CMIN=2.370, $p=.668$
- DF=4, CMIN/DF=.592
- GFI=.996
- RMSEA=.000, CFI=1.000

Figure 4.13 Test of Moderator Effect of Materialism
Table 4.18 Regression Weights of Figure 4.13 (Default model)

<table>
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<tr>
<th>Label</th>
<th>Estimate</th>
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<th>C.R.</th>
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<th>ZEB</th>
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<th>ZEB</th>
<th>ZEC</th>
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</table>

*** Correlation is significant at the 0.001 level (2-tailed)

Moderation Effect of Materialism on Green Purchasing Behaviour

CMIN=1.583, p=.812
DF=4, CMIN/DF=.396
GFI=.997
RMSEA=.000, CFI=1.000

Figure 4.14 Model of Moderator Effect of Materialism
Table 4.19 Regression Weights of Figure 4.14 (Default model)

<table>
<thead>
<tr>
<th></th>
<th>Estimate</th>
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*** Correlation is significant at the 0.001 level (2-tailed)

In order to compare with the findings in a similar study in the United States (Kilbourne and Pickett, 2008), another model is fitted to test the indirect effect of materialism on environmental beliefs. The result of the fitted model is shown in Figure 4.15 and Table 4.20 with the following summary: chi-square = 18.95 (p=.008 < .05), CMIN/DF= 2.71 <3, GFI = .971 > .9, CFI= .948 > .9, RMSEA= .089 > .08. The model is not well fitted. The correlations between the individual factors and environmental beliefs do not support that materialism affects environmental beliefs and subsequently exerts an indirect effect on green purchasing behaviour.
Indirect Effect of Materialism on Green Purchasing Behaviour

CMIN=18.949, p=.008
DF=7, CMIN/DF=2.707
GFI=.971
RMSEA=.089, CFI=.948

Figure 4.15 Test of Indirect Effect of Materialism on Green Purchasing Behaviour

Table 4.20 Regression Weights of Figure 4.15 (Default model)

<table>
<thead>
<tr>
<th></th>
<th>Estimate</th>
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*** Correlation is significant at the 0.001 level (2-tailed)
4.8 Summary of Findings

There is no gender difference on both materialistic value and green purchasing behaviour among the participants. On the other hand, the younger generation, age below 35, has a higher materialistic value than the mature age group. However, this difference does not lead to any difference in the green purchasing behaviour between these two age groups.

The scale measurements for environmental beliefs, environmental concern, and green purchasing behaviour have high Cronbach’s alpha values above .8, indicating that these scales have high reliability. The Cronbach’s alpha value for the materialism scale is .63, indicating that the internal consistency is at the low side of the acceptable range. This is because that the scale has three major components.

Exploratory factor analysis confirms that the materialism scale has three major components. However, the items that load onto these components are not the same items that load on the components of other studies using the same scale.

Environmental concern is a mediator of relation between environmental concern and green purchasing behaviour, and the mediation has a total effect.

One of the components of the materialism, F2 has a negative correlation with environmental concern and green purchasing behaviour. This factor has a
negative moderator effect on the relation between environmental beliefs and environmental concern, but it does not have significant moderation effect between the relation of environmental concern and green purchasing behaviour.

Materialism as a whole has a negative effect on environmental concern, but it does not have a direct negative effect on green purchasing behaviour.

Materialism as a whole does not have any significant effect on environmental beliefs. It affects green purchasing behaviour through a negative moderator effect on the relation between environmental beliefs and environmental concern.
Chapter 5   Discussion and Conclusion

5.1 Introduction

This chapter discusses the results of the analysis and interprets the findings from the perspective of green marketing and sustainable development. It also covers the implications of the findings to the researchers and practitioners. As this is a DBA dissertation being carried out with limited resources and timing, there are several limitations of this study and they are highlighted. Lastly, recommendations for future research are suggested and a conclusion of this study is made.

5.2 Major Findings

5.2.1 Demographic Difference on Materialism and Green Purchasing Behaviour

There are many studies on the demographic characteristics of green consumers in many different countries (Roberts, 1996; Straughan and Roberts, 1999; Laroche et al., 2001; Dietz et al., 2002; Tanner and Kast, 2003; Jain and Kaur, 2006; Shen and Saijo, 2007), and the findings are equivocal. The findings of this study also support the recent thinking that green purchasing behaviour is not depended on gender or age group. Instead, it correlates to the environmental concern of consumers.

However, the materialistic value has different relations to the demographic characteristics of the participants. While there is no significant difference on
materialistic values between female and male participants, the young generation displaces a significant higher materialistic value than the mature age group. This is not an unexpected finding as Hong Kong has been promoting equal opportunities on gender for a long time, and therefore the gap between the genders in many aspects is getting smaller. This is in line with the finding, among the children in Hong Kong, that there was no gender difference in materialistic values (Chan, 2003). The finding of a recent study in the United States on materialism and quality of life also supports that there is no gender difference on materialism (Roberts and Clement, 2007). However, another study in Australia reports that male has higher materialistic tendencies than female (Kaminie and O’Cass, 2000). On the other hand, young generation is expected to have a higher materialistic value than the mature participants, and such finding is in agreement with the findings of other studies (Roberts and Clement, 2007).

An interesting phenomenon is that the high materialistic value of the young generation does not lead to a significant difference in green purchasing behaviour when compared with the mature age group that has a lower materialistic value. This finding is, however, in line with an earlier finding in Australia that materialism has little effect on selection of high priced brand (Kaminie and O’Cass, 2000).

Although the sample is highly educated people, the overall materialistic value of the sample is only above average. It is difficult to explain the level of materialism with limited data in a cross sectional study. The sample is a
mixture of both full-time and part-time post-secondary students and can represent a middle class of Hong Kong people. During the two major economic downturns in the last decade in many parts of the world including Hong Kong, the middle class is heavily hit. This may partly explain the relatively low materialistic value obtained in this study. It is because that economic development does affect materialistic values in Chinese societies (Tse et al., 1989). On the other hand, under the Chinese culture of man-himself orientation, people may be conservative in expression oneself and thus leading to a lower materialistic value in the study. However, there is no evidence under this study to link this dimension of Chinese culture directly to the materialistic value of the sample.

5.2.2 Exploratory Factor Analysis of Materialism Scale

The materialism scale has a moderate Cronbach’s alpha value of .63 and therefore it may load on a few related factors. The result of the exploratory factor analysis confirms that it loads on three major factors. In the original scale development, Richins and Dawson (1992) identify the eighteen items material values scale with three interrelated factors. They are the acquisition as the pursuit of happiness, acquisition centrality, and possession-defined success; they are known as happiness, centrality, and success respectively. The original eighteen items have five items belong to happiness, seven items belong to centrality, and six items belong to success. The scale was later shortened to fifteen items with five items for each factor, with further short forms of nine and six items (Richins, 2004). Although the nine items of the scale measurements in this study load on to three factors, the grouping of the
items are not the same grouping of items under the scale proposed by Richins (2004).

To facilitate an understanding of this situation, a review of the selection of the items for use in this study was made. First, the nine items materialism scale used in this study were adopted from an earlier and similar study by Kilbourne and Pickett (2008). These nine items are not exactly the nine items of the short form suggested by Richins (2004). However, Kilbourne and Pickett (2008) select the nine items based on their earlier finding (Kilbourne et al., 2005) that these nine items are consistent with the original dimensionality when applied in three countries. As one of the purposes of this study is to compare the findings in Hong Kong to the findings in the United States, the items used in this study are the same items used by Kilbourne and Pickett (2008).

The results of this study show that four items load on the factor of success. Two items belong to the factor of success in the original scale, they are items A1 “I admire people who own expensive homes, cars, and clothes”, and item A2 “Some of the most important achievements in life include acquiring possessions”. Another two items belong to the factor of happiness in the original scale, they are items A8 “My life would be better if I owned certain things I don’t have”, and item A9 “I would be happier if I could afford to buy more things”. A close examination of items A8 and A9 suggests that these two items could be closely related to the factor of “success” as well as “happiness”, as possession could be a symbol of success in the context of
Hong Kong.

On the factor of centrality, only two items, A4 and A5 are loaded on this factor. The item A3 that supposedly belongs to the factor of success, loads on to the third factor with the other two items A6 and A7. The item A6 is supposed to load on the factor of centrality, and the item A7 is supposed to load on the factor of happiness. These three items are now loaded on to a factor, which does not have a clear dimension.

The overall result of the exploratory factor analysis shows that the dimensionality of the items in this study does not match with the dimensionality of the scale when it was developed and applied in other studies. One possible explanation is the diverse material values among the students in Hong Kong. Another possible explanation is the interpretation of the questions by the student participants in the Hong Kong context. In fact, Richins (2004) points out that the dimensional purity of the material values scale and the possible impact of socially desirable responding are two concerns of the scale, and concludes that the nine items short form is designed for the assessment of the overall materialism at a general level, but it is not suitable for use to analysis materialism at the subscale level. Therefore, the findings of this study show that the nine items scale is not suitable for use at the subscale level. Nevertheless, it is suitable for use for the overall materialism level as the scale has a Cronbach’s alpha value of .63.
5.2.3 Confirmatory Factor Analysis of Materialism Scale

The confirmatory factor analysis confirms that the materialism scale is loaded on to three major factors with the items mentioned above. Although the CFA model is fitted, there is room for improvement. By removing items A6 and A8 that have a low correlation to the corresponding factor, a much better fitted model is generated. The chi-square of the revised model is reduced from 33.00 to 10.08, the GFI and AGFI are getting closer to 1, and RMSEA is reduced from .045 to .00. This result shows that the materialism scale with the seven remaining items serves as a good measurement for the latent construct of materialism among the participants in Hong Kong (Figure 4.4).

A second order confirmatory factor analysis (Figure 4.5) confirms that the latent construct of materialism is measured by the seven items scale with a very well model fitted. The first factor related to success has three items, the second item related to centrality has two items, and the third factor related to happiness on success has two items. The correlation of the first factor F1 to the latent construct of materialism is only .29, whereas the correlations of the second factor F2 and the third factor F3 to materialism are much higher, at .65 and .86 respectively. This result suggests that the domain of success is not the most important factor of the material values among post-secondary students in Hong Kong. Instead, happiness is closely related to materialism in Hong Kong.
5.2.4 Mediator Effect of Environmental Concern

Mediator effect and moderator effect are sometimes reported inconsistently in literatures (Frazier et al., 2004, Holmbeck, 1997), and it is therefore useful to briefly explain the differences between mediator and moderator before further discussion is made on the subject. Mediator is a variable that explains the relation between the predictor variable and the dependent variable, and moderator is a variable that alters the strength or direction of the relation between the predictor variable and the dependent variable (Baron and Kenny, 1986; Holmbeck, 1997; Frazier et al., 2004). In other words, mediator establishes “why” or “how” the predictor causes the outcome, but the moderator explains “when” or “to whom” a predictor is more strongly related to an outcome. Therefore, in analysis of mediator effect, focus is placed on how the mediator changes the relation between the predictor variable and the dependent variable. In analysis of the moderator effect, focus is placed on whether the interaction between the predictor and the moderator, the product term, is significant in predicting the outcome.

The theory of planned behaviour suggests that attitude affects the purchasing behaviour through purchase intention (Ajzen, 1991). The attitude on the environment is therefore important in green purchasing behaviour and has been studied by many researchers in the last two decades (Bamberg and Möser, 2007; Kilbourne and Polonsky, 2005; Iversen and Rundmo, 2002; Schlegelmilch et al., 1996). However, environmental attitude is a not a well defined term (Minton and Rose, 1997). The heading of the research papers by Daniere and Takahashi (1999), Chan (1999b), and Franzen (2003)
contains the word “environmental attitude’ but they have different meanings in the papers. The term environmental attitude is therefore not used in this study. Instead, two closely related constructs, environmental beliefs and environmental concern, which were used in a recent study by Kilbourne and Pickett (2008), are adopted. Environmental beliefs are one’s knowledge and beliefs on what is happening to the environment, in particular the impact of human activities on the environment. Environmental concern is how much one cares for the quality or changes to the environment. Although there are studies that support environmental attitude is strongly correlated to green purchasing behaviour (Korfiatis et al., 2004, and Franzen, 2003), the result of this study shows that environmental concern has a total mediator effect on environmental beliefs and green purchasing behaviour.

The finding of this study suggests that environmental concern is a mediator between environmental beliefs and green purchasing behaviour. However, this finding is different from the finding of a similar study by Kilbourne and Pickett (2008) in which environmental concern is shown to have an indirect effect between environmental beliefs and environmental responsible behaviour, but no attempt is made to examine whether environmental concern has a mediator effect. The environmental concern measured in this study includes two dimensions, one is the individual concern on the environmental quality and the other is the social concern on the collective social actions that need to protect the environment. The total mediator effect of environmental concern means that this is the variable that plays a key role in driving for the green purchasing behaviour in protecting the environment.
However, it shall be noted that the finding of this study is different from an earlier study in Hong Kong (Yam-Tang and Chan, 1998). In examining how consistent consumers' actions are with their attitudes towards seven environmentally sensitive products, Yam-Tang and Chan (1998) report that consumers' environmental concern is not reflected in their purchasing behaviour. However, there is a time difference of more than a decade between this study and the study of Yam-Tang and Chan (1998). The impact of environmental education and environmental activities during this period may partly explain the different finding of these two studies.

5.2.5 Moderator Effect of Materialism

Although materialism may increase the economic growth of a society, it has been shown that materialism has a negative effect on consumer ethics (Muncy and Eastman, 1998) and pro-environmental behaviour (Tilikidou and Delistavrou, 2004). How materialism affects green consumer behaviour is an interesting subject for both researchers and practitioners who would like to help protect the environment through green marketing. While a recent study in the United States shows that materialism negatively affects the green purchasing behaviour through a negative effect on environmental beliefs at each of the three major materialistic domain level of success, centrality, and happiness (Kilbourne and Pickett, 2008), the result of this study, however, does not support that all three major factors of materialism negatively affect environmental beliefs. Instead, only the factor of centrality negatively affects environmental beliefs significantly. As both studies are similar in nature, the differences may be attributed to the sampling difference. The study in the
United States uses a telephone random sampling of residents in the United States, and this study uses a convenient sampling of students in Hong Kong. Cultural issue is also a possible cause for the difference.

Based on Hofstede’s dimensions of culture, it was found that people in the United States have significantly different values on Hofstede’s dimension of culture than people in Hong Kong (Itim International, 2010). People in the United States have a very low value on long-term orientation, but a very high value on individualism; whereas people in Hong Kong have a very high value on long-term orientation, but a very low value on individualism. The Hofstede’s dimension of long-term orientation represents Chinese’s Confucian value. Therefore, the belief in Confucianism about the man-nature orientation together with low individualism values may help explain the difference on the impact of materialism on environmental beliefs between the United States and Hong Kong.

Whether a third variable has a moderator effect on the predictor variable and the dependent variable shall be tested on a moderator model with three paths, a path from the predictor to the dependent, a path from the moderator to the dependent, and a path from the product term of predictor and the moderator to the dependent. A moderator hypothesis is supported when the path from the product term to the dependent is significant (Baron and Kenny, 1986). Although there may be significant main effect from the predictor and the moderator to the dependent, they are not directly relevant in testing the moderator effect. The result of the structural equation modelling on the
moderator effect of the individual factors of the materialism scale shows that the factor of centrality has a moderator effect on environmental beliefs and environmental concern. It is because that the product term of environmental beliefs and the factor centrality $F_2$ is significant (Table 4.16, $p = .011 < .05$). The other two factors of materialism have neither significant negative correlations with environmental concern nor moderator effect with environmental beliefs.

A similar analysis on the overall materialism scale shows that materialism as a whole has a significant negative effect on environmental concern (Table 4.19, $p = .008 < .01$). However, it does not have a moderator effect on environmental beliefs or on green purchasing behaviour. Therefore, the findings suggest that materialism does not have a major role to play in the green purchasing behaviour in Hong Kong. This conclusion echoes the earlier discussion in section 5.2.1 that the high materialistic value of the young generation does not lead to a significant difference in green purchasing behaviour when compared with the mature age group that has a lower materialistic value. Although this conclusion is different from the findings of the study of Kilbourne and Pickett (2008), there are some research works that arrive at a similar conclusion that materialism does not have an adverse impact on student behaviour, such as the use of credit card (Pinto et al., 2000), the attitude on debt (Watson, 1998), and the perception of high priced brand (Kamineni and O’Cass, 2000).

On the other hand, it should be noted that the factor of centrality does have a
negative effect on green purchasing behaviour. The research question of this study is how materialism affects the green purchasing behaviour in Hong Kong, and the result of this study reveals that the factor of centrality in materialism affects the green purchasing behaviour with a moderator effect on the relation of environmental beliefs and environmental concern; and environmental concern has a total mediation effect on environmental beliefs and green purchasing behaviour.

5.3 Implications to Researchers

This study reveals how materialism affects green purchasing behaviour in Hong Kong. It provides knowledge on using the nine items short form materialism scale (Richins, 2004) with students of Hong Kong. While many previous researchers have reported that the materialism scale are loading properly on the three factors of success, centrality, and happiness (Kilbourne and Pickett, 2008; Roberts and Clement, 2007; Muncy and Eastman, 1998), the results of this study does not strongly support such factor loading. Apart from this study, there are research findings reporting that the material value scale of Richins and Dawson (1992) does not work very well outside the United States (Griffin et al., 2004). When the eighteen items materialism scale is applied to the sample in Denmark, France, and Russia, the scale does not fit very fit in the confirmatory factor analysis by structural equation modelling in French and Russia. Therefore, it may be worth exploring the use of the fifteen items materialism scale (Richins, 2004) for studying materialism in Hong Kong or other places where cultural difference may have an impact on the use of the scale. Alternatively, researchers in Hong Kong may explore
the use of other scale measure for materialism or develop a scale for this measurement.

The variable environmental concern has been shown to be a mediator between the predictor variable environmental beliefs and the dependent variable green purchasing behaviour, and there are items of individual concern and social concern in the scale measurement. Therefore, additional focus shall be made in understanding this variable in study of environmentally responsible behaviour.

5.4 Implications to Practitioners
Marketers are in continual searching for market segments for their products and services. Without any exception, this approach is also practised by green marketers. The descriptive statistic analyses of the data show that there is no gender difference on the materialistic values of the college students, and even though there is different materialistic value between the young generation and the mature age group, such difference does not affect their green purchasing behaviour significantly.

In searching for green consumers, marketers shall focus on their environmental concern, rather than their environmental beliefs, as it is shown that environmental concern has a total mediator effect on environmental beliefs among the consumers in Hong Kong. Therefore, advertisement of green products shall also focus on the dimension of environmental concern rather than the environmental beliefs.
As the overall materialism construct does not have significant negative moderator effect on environmental beliefs and environmental concern, this means that consumers with high materialistic value could also be a green consumer. Marketers of green products should not avoid the market segment of customers with high materialistic values.

The government, green group and NGO may like to note the level of materialism, environmental beliefs, environmental concern, and green purchasing behaviour of the student sample. In brief, the overall materialism value is 4.07 of the seven point Likert scale, meaning that it is an above average value. The environmental beliefs value is 6.00 of the seven point Likert scale, meaning that the attitude of environmental beliefs is high. However, the environmental concern value is 5.71 of the seven point Likert scale, meaning that the corresponding environmental concern is a bit lower than the level of environmental beliefs. However, this is in line with a recent study in Hong Kong in which the average score for the environmental concern scale is 3.09 of a four point Likert scale (Wong and Wan, 2009). The overall green purchasing behaviour value is 4.94 of the seven point Likert scale, meaning that the actual green purchasing behaviour of the sample is not very high, but above average. Therefore, there is room to improve the green purchasing behaviour of the public in Hong Kong. According to the findings of this study, an increase in environmental concern of the green consumers in Hong Kong would help increase their green purchasing behaviour.
5.5 Limitations and Future Research

There are several limitations for this study that shall be noted. First, the sample size of 216 is relatively small, and the sample population is post-secondary student. Furthermore, convenient sampling rather than random sampling was used. The choice of such a limited sampling strategy was made on the basis of limited resources and time available to a part-time student. However, it has been shown that the general environmental attitudes and the pro-environmental purchasing behaviour between student sample and the general public sample are significantly different (Schlegelmilch et al., 1996). Therefore, despite that many studies on green marketing research use student sample, and it has been reported that marketing student sample responses very similar to the public sample (Synodinos, 1990); the interpretation of the findings from this study should be made with caution on the sampling.

Second, the study is a snap shot of the green purchasing behaviour as it is a cross sectional design study. As it is hypothesized, and later confirmed by the data of this study, that environmental concern is a mediator of environmental beliefs and green purchasing behaviour, a longitudinal research design that collects data on the change of environmental concern and the change in green purchasing behaviour over a period of time on the same sample would be more useful in testing the hypothesis. It is because that attitude of a society such as environmental concern and green purchasing behaviour are subject to many influences and may change with respect to time. Once again, this student research work does not have the resources for a longitudinal
research design.

Third, social value orientation is a variable that may affect the findings of study in purchasing behaviour (Gärling et al., 2003). Social desirability bias is a concern on marketing research as it may affect the scale validity (King and Bruner, 2000). However, social desirability is not included in this study. It is therefore suggested that future studies should include this dimension.

Fourth, culture is an important factor that affects human behaviour. However, it is difficult to operationalize culture. Soares et al. (2007) proposes a three-step approach to operationalize culture, which includes nationality, Hofstede’s dimensions of culture, and measurement at individual level. This study does not include the measurement at individual level and cannot explain some of the findings which may be influenced by culture in detail.

Furthermore, it is suggested that future research may consider testing of a random sample of a wider population, including the measurement of culture at individual level, conducting a qualitative approach for identifying factors that affect the mediator variable environmental concern and the effective approaches or strategy for up lifting the environmental concern of the public, developing a materialism scale for use in Hong Kong, and organizing a longitudinal research to investigate the changes on green consumer behaviour.
5.6 Summary and Concluding Remarks

Green marketing is a voluntary measure for corporations to share their responsibility on sustainable development. However, green marketing has not been very successful since it was introduced about two decades ago. The consumer support of purchasing green products is a crucial factor to sustain the concept of green marketing. This study aims to provide the information to fill the knowledge gap on how materialism affects the green consumer behaviour in Hong Kong where East meets West in a major economic and financial centre.

The results of the study show that environmental concern has a total mediator effect on environmental beliefs and green purchasing behaviour. However, materialism as a whole does not have significant moderator effect on either environmental beliefs or environmental concern and green purchasing behaviour. From the findings of descriptive statistics, the level of green purchasing behaviour in Hong Kong is not high, but above the average; and there is no gender or age difference on the green purchasing behaviour.

The findings are in line with other studies that conclude materialism does not have significant association with many student behaviours of high concern, such as use of credit card use, attitude on debt, or perception of high priced brand. The findings are useful for practitioners to formulate their marketing strategy on green product offering, and for green groups or NGO to formulate their environmental activities.
The limitations of the study are highlighted, and areas for improvement for future research, such as the qualitative study on factors affecting the environmental concern and the development of the materialism scale for Hong Kong are recommended.
References


Gliem, J. A. and Gliem, R. R. (2003) Calculating, Interpreting, and Reporting Cronbach’s Alpha Reliability Coefficient for Likert-Type Scales, Presented at the *Midwest Research-to-Practice Conference in Adult, Continuing, and Community Education*, Ohio State University October 8-10, Columbus, OH.


Appendices
### One-Sample Kolmogorov-Smirnov Test of All Items

<table>
<thead>
<tr>
<th>Item No.</th>
<th>N</th>
<th>Normal Parameter a,b</th>
<th>Most extreme Differences</th>
<th>Kolmogorov-Smirnov Z</th>
<th>Asym p. Sig. (2-tailed)</th>
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a Test distribution is Normal.

b Calculated from data
### Appendix II

**Descriptive Statistics of Skewness on Transformed Items of Environmental Beliefs, Environmental Concern and Green Purchasing Behaviour**

<table>
<thead>
<tr>
<th>Transformed Items</th>
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<th>Std. Error of Skewness</th>
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<tbody>
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<td>Valid</td>
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<tr>
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<tr>
<td>RefLnRB2</td>
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</tr>
<tr>
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<td>-.359</td>
</tr>
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</table>

RefLnR means reflect-natural log-reflect, RefSRR means reflect-square root-reflect
### Descriptive Statistics of Three Factors of Materialism Scale

<table>
<thead>
<tr>
<th>Statistic</th>
<th>F1</th>
<th>F2</th>
<th>F3</th>
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</thead>
<tbody>
<tr>
<td>N</td>
<td>216</td>
<td>216</td>
<td>216</td>
</tr>
<tr>
<td>Minimum</td>
<td>-2.53874</td>
<td>-2.41973</td>
<td>-2.88185</td>
</tr>
<tr>
<td>Maximum</td>
<td>2.31840</td>
<td>2.60666</td>
<td>2.68903</td>
</tr>
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<td>.0000000</td>
<td>.0000000</td>
</tr>
<tr>
<td>Std. Deviation</td>
<td>1.0000000</td>
<td>1.0000000</td>
<td>1.0000000</td>
</tr>
<tr>
<td>Skewness</td>
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<td>.152</td>
<td>-.027</td>
</tr>
<tr>
<td>Kurtosis</td>
<td>-.227</td>
<td>-.360</td>
<td>.039</td>
</tr>
<tr>
<td>Std. Error</td>
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<td>.166</td>
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<tr>
<td></td>
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<td>.330</td>
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</table>
Appendix IV

Normal Distribution of the Three Factors of the Materialism Scale

Distribution of F1

Distribution of F2

Distribution of F3
### Materialism

<table>
<thead>
<tr>
<th>Statement</th>
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</thead>
<tbody>
<tr>
<td>I admire people who own expensive homes, cars, and clothes</td>
<td></td>
</tr>
<tr>
<td>Some of the most important achievements in life include acquiring</td>
<td></td>
</tr>
<tr>
<td>possessions</td>
<td></td>
</tr>
<tr>
<td>I don't place much emphasis on the amount of material objects people</td>
<td></td>
</tr>
<tr>
<td>own as a sign of success (R)</td>
<td></td>
</tr>
<tr>
<td>I usually buy only the things I need (R)</td>
<td></td>
</tr>
<tr>
<td>I try to keep my life simple, as far as possessions are concerned (R)</td>
<td></td>
</tr>
<tr>
<td>The things I own aren't really that important to me (R)</td>
<td></td>
</tr>
<tr>
<td>I have all the things I really need to enjoy life (R)</td>
<td></td>
</tr>
<tr>
<td>My life would be better if I owned certain things I don’t have</td>
<td></td>
</tr>
<tr>
<td>I would be happier if I could afford to buy more things</td>
<td></td>
</tr>
</tbody>
</table>

### Environmental Beliefs

<table>
<thead>
<tr>
<th>Statement</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Many types of pollution are rising to dangerous levels</td>
<td></td>
</tr>
<tr>
<td>Some living things are being threatened with extinction</td>
<td></td>
</tr>
<tr>
<td>Continued use of chemicals in agriculture will damage the environment</td>
<td></td>
</tr>
<tr>
<td>Shortages of some important resources will occur in the near future</td>
<td></td>
</tr>
<tr>
<td>Global warming is becoming a problem</td>
<td></td>
</tr>
<tr>
<td>Ozone depletion is an environmental problem</td>
<td></td>
</tr>
<tr>
<td>The availability of clean water will become a problem in the future</td>
<td></td>
</tr>
</tbody>
</table>
### Environmental Concern

| I am very concerned about the environment |
| Humans are severely abusing the environment |
| I would be willing to reduce my consumption to help protect the environment |
| Major political change is necessary to protect the natural environment |
| Major social changes are necessary to protect the natural environment |
| Anti-pollution laws should be enforced more strongly |

### Green Purchasing Behaviour

| I make a special effort to buy paper and plastic products that are made from recycled materials |
| I have switched products for ecological reasons |
| When I have a choice between equal products, I purchase the one less harmful to other people and the environment |
| I make a special effort to buy household chemicals such as detergents and cleansing solutions that are environmentally friendly |
| I have avoided buying a product because it had potentially harmful environmental effects |