DISSERTATION

ADOPTER SEGMENTATION OF KEDAH MALAYS ON ENVIRONMENTAL ISSUES AND DIFFUSION OF INNOVATIONS

Submitted By

Manohar Mariapan

Department of Natural Resource Recreation and Tourism

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WE HEREBY RECOMMEND THAT THE DISSERTATION PREPARED UNDER OUR SUPERVISION BY MANOHAR MARIAPAN ENTITLED ADOPTER SEGMENTATION OF KEDAH MALAYS ON ENVIRONMENTAL ISSUES AND DIFFUSION OF INNOVATIONS BE ACCEPTED AS FULFILLING IN PART REQUIREMENTS FOR DEGREE OF DOCTOR OF PHILOSOPHY.

Committee on Graduate Work

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Adviser

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Department Head

ABSTRACT OF DISSERTATION

ADOPTER SEGMENTATION OF KEDAH MALAYS ON ENVIRONMENTAL ISSUES AND DIFFUSION OF INNOVATIONS.

The purpose of this study was to segment Kedah Malays into adopter groups on environmental issues based on their personality characteristics and to compare the groups across various dependent variables related to environmental issues. The results were obtained from 550 surveys of personal interviews conducted in Kedah, Malaysia in August of 2000.

The adopter categories used in this study were adapted from Roger's (1995) "diffusion of innovation" model. The adopter groups for the study were (1) innovators, (2) early adopters, (3) majority, and (4) laggards. Respondents were placed into adopter groups based on how they responded to a question that required them to take an action on a hypothetical environmental issue. The four responses to the question represented the four adopter groups and were based on Rogers (1995) adopter group characteristics.

The adopter groups were discriminated by five personality and two socio-economic variables using discriminant function analysis. The discriminant function analysis revealed that the seven predictor variables accounted for 71% of the absolute variance in the discrimination of the adopter groups. The personality variables dogmatism and fatalism explained most of the variance in discriminant function I, which accounted for 81 % of the total variability. The discriminant model correctly classified 91 % of the originally grouped cases. Earlier adopters placed higher importance on environmental issues than later adopters on the study hypotheses.

The results of this study demonstrate the ability to segment people into discrete audience segments based on their personality related to environmental tendencies. This ability has implications on environmental communications strategies to the various publics in Malaysia. In addition, these results have implications on the management of National Parks and amenity forests in Malaysia as it relates to environmental interpretation as a management tool. Lastly, understanding audience adopter characteristics will enhance the effectiveness of environmental campaigns in Malaysia.

Manohar Mariapan
Department of Natural Resources
Recreation and Tourism
Colorado State University
Fort Collins, Colorado 80523
Fall 2001

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INTRODUCTION

In the course of human history, the environment has been changed and planet earth has been transformed in many different ways. Whether good or bad, the facts are evident that earth is facing problems such as global warming, pollution of the oceans, ozone depletion, and declining biodiversity. Never before, have the world's economic and ecological systems been so closely interconnected, to the extent that earth has had to endure many abuses in the name of development. All the major components of a biosphere such as vegetation, soils, fauna, water, climate, and landforms have been profoundly altered by human activity.

As long as human civilization exits, there will be change, development, and there will be progress. Conservation should not just be limited to the protection of natural resources and the environment. Conservation advocates, especially in Malaysia, should educate the public on environmental issues so that the public is aware of what is happening in the environments. Scientists in the conservation arena encourage sustainable development, but most of the action occurs at the agency and policy formulation levels and does not involve the public. Even when the public is included in these processes, they might have no understanding of what the issues are and how the issues can affect them. Therefore, they have little incentive to care about any of these environmental issues.

The primary purpose of this research is to segment people into various adopter categories based on the diffusion of innovation model presented by Rogers (1995). People are classified into adopter categories based on their innovativeness of adopting a new technology or idea based on the amount of time that lapsed from product availability to actual adoption. The adopter categories include innovators, early adopters, early majority, late majority, and laggards. This study also demonstrates how techniques of audience segmentation in conjunction with characteristics of the various adopter categories (Rogers, 1995) were used to validate group discriminators and compare group differences on various issues. Discriminators are independent variables used in discriminant function analyses to predict group's differences.

This document is composed of five chapters: Introduction, Theoretical Framework, Research methodology, Results, and Implications. This first chapter has four sections. The first section presents the problem statement and justification for the study. The second section addresses the study objectives. The third section will be devoted to background information about the people, the culture, and the natural environment of Malaysia. Section four is for the definition of key terms.

Problem Statement

People and conservation

Conservation of our natural environment is a major concern today in most western civilizations. A popular topic among conservationists worldwide during the past three decades is the discussion of how to effectively protect biological diversity on our planet. Both scientists and the public in most developed countries have realized that is mass extinctions of various floras and faunas (Primack, 1993). In general, the western cultures tend to have strong feelings about conservation of the environment.

As for the less developed countries, the public might not feel the same way since they have to take care of their basic needs first. According to Maslow (1959), people must first fulfill their more fundamental needs, such as food, clothing, and safety needs such as basic shelter before they can think about serving the needs of the society such as protecting natural resources and the environment.

There is a growing international awareness of global environmental problems focusing on the loss or degradation of natural resources, regardless of where they occur geographically (e.g. biodiversity, the atmosphere, the stratospheric ozone shield, rainforest, marine ecosystems, and eco-complexes, etc).

The natural areas in Malaysia face the same problems as the rest of the world, but are the people in the country aware of what is really happening to their natural resources? Are they concerned at all about the degradation of their natural environment, and do they realize how their quality of life is, and might be affected? Conservation is key to this problem. We need to inform and educate the average Malaysian who visits or lives near natural areas about the importance of conserving these fragile resources. Why should they even care about these issues when they feel that they might have other urgent matters to take care of?

A preliminary qualitative study conducted by the researcher in the spring of 2000 revealed that Malays did not feel that the health of the natural surroundings was of crucial concern. The subjects, consisting of people from all walks of life, unanimously suggested that their immediate concerns were basic needs for daily living. This includes, food, clothing, a roof over their heads, a reliable transportation system, and education for their children.

Most Malaysians do not seem to worry about losing their natural areas. There does not seem to be any kind of urgency by the locals to preserve or protect their remaining natural resources. This might be because the status and conditions of the natural areas in Malaysia are not being conveyed to the people. People tend to take things for granted. As far as they are concerned, everything looks green and alive. Therefore, to them the natural areas must be doing just fine.

Furthermore, people may think that the Malaysian Forestry Department and the Wildlife Department are supposed to take care of the natural resources, since they are the experts. This is a culture that trusts the relevant authorities to take care of things for them because their power-distance[1] requirement is large. People are more worried about becoming a modern, developed society, trying to earn more money, and becoming consumers of western luxury goods. This is a question of priority in life and the lack of exposure to information regarding conservation of natural resources issues and other environmental issues.

Malaysia has many different types of natural areas that the public has the opportunity to visit, which are available all year long. Nevertheless, there are few efforts taken by Malaysian authorities to heighten public awareness about relationships between the natural environment and how the environment can affect the public's quality of life. This is especially the case at the grassroots level.

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[1] Power distance-term refers to the way society deals with the fact that people are not equal . Most collectivist cultures such as in Malaysia have large power distances (Hofstede, 1983).

As far as the public is concerned, these natural areas have always been a part of the local culture and tradition. Extraction of minor forest products such as rattan, honey, wild fruits, medicinal plants, and other forest products traditionally was a common practice. However, since her independence in 1957 from the British, Malaysia has become a prosperous nation economically and socially. Today, people only visit the natural areas for leisure purposes.

In order to understand the Malaysian public, we have to learn about their environmental values, the importance they place on natural resources, and their perceptions towards local conservation issues. The current system of management of natural recreation areas does not favor the communication of conservation information to visitors. The management of these resources is mainly based on physical infrastructures such as the maintenance of trails, shelters, and restroom facilities for the visitors. Almost 95 percent of the individuals working in natural areas were trained as foresters. The staff for the natural recreation areas knows more about timber harvesting and silvicultural treatments than they do about managing resources for recreation. Furthermore, there is very low priority to place forest rangers at recreational settings because of budget and personnel constraints of the Malaysian Forestry Department.

Since the last five to seven years, eco-tourism has become a major area of interest in Malaysia. The government, through the Malaysian Tourism Development Corporation, has been actively marketing eco-tourism to international and local tourism markets. The forestry department of Malaysia and the wildlife department are the authorities responsible for managing natural recreation areas. The forestry department has plans to hire more qualified staff to manage the natural resources for recreation and tourism (Wan, 1998). In 1994, a local University, Universiti Putra Malaysia, started a new Bachelor of Science degree program in the field of recreation resource management.

Persuasion / Education/ Interpretation

In the past, there has never been any serious effort in Malaysia to provide environmental interpretation to tourists, visitors, and users at natural areas, especially personal interpretation, which is almost non-existent. As a developing country, Malaysia is just now moving towards becoming an affluent society. Increasingly, local people are visiting the natural areas. They want to do leisure activities outside of the five to six day workweek. Management should attempt to educate these people about conservation, protection, and wise use of the limited natural resources.

In the United States, environmental interpretation and educational activities have long been a part of a visitor's recreational experience at parks and forests. In many parts of the world, interpretation can serve many functions including: entertainment of visitors; education about the area, or to be used as a management tool to encourage proper visitor behavior (Morgan & Oh, 1993; Sharpe, 1982; Tilden, 1977).

In Malaysia, the field of interpretation needs to be expanded beyond its traditional park and forest base to encompass new topics, different areas, and a mix of participant types. As interpreters seek opportunities to interact with their audience in these new areas of interpretation, it will become increasingly important to learn more about the audience participating in interpretive activities, particularly their motivations and preferences for participation.

How can we accomplish this task in Malaysia, when right now there is little information about the characteristics of the local peoples' environmental affinities? In general, professional interpreters in the United States often assume they know what the public wants and needs in an interpretative program (Adam & Hammitt, 1995). However, as with any service, it is important to solicit information from the audience to ensure that interpreters understand the needs and wants of the public and to ensure that these needs are addressed properly.

Therefore, there is a need to learn about the publics' demographics, psychosocial elements, and behaviors relative to natural environments. By answering some of these questions, interpreters and environmental educators will begin to develop, provide, and communicate effective conservation messages and information for the various Malaysian publics. It is key that we begin to know and understand our natural resource publics (users and non-users) if we intend to develop effective messages that will promote conservation of natural resources in Malaysia.

Audience Segments

It is crucial to use the appropriate messages and techniques to reach out to the various segments of our audience with conservation messages. Since interpretation in Malaysia is still at its infant stage, we should try to develop programs that best suit the local situation. Most of the interpretation literature that were examined in this research acknowledged the importance of knowing one's audience in order to provide effective interpretive messages. However, sound scientific solutions to determine the profile of various segments of the publics for interpretation were not evident in the literature for the Malaysian context. We need better science-based research that will help us to understand our audiences. Then, we can provide the best possible interpretive messages about environmental issues.

The USA Model for Interpretation

In the USA and other developed countries, the major emphasis in environmental awareness has been the development of interpretive programs based in parks and protected areas. These efforts typically represent the continuation of an historical tradition of interpretation; with trained specialists, working for organizations that possess established interpretive functions. By contrast, developing countries, like Malaysia, lack this tradition as well as the financial resources and technically trained employees that are necessary to establish solid interpretation foundations.

Therefore, there is a need for valid scientific data on local publics relative to natural resources issues that would lend support for the development of interpretation foundations in Malaysia. The expansion of the pool of research data and knowledge based on science is needed and must be made available to resource managers and interpreters in the country.

Even if Malaysia can obtain funding and technical assistance for interpretation, should she be adopting the models from developed nations? The differences in culture, psychosocial elements, demographics, and other factors should be reasons enough for Malaysia to develop her own interpretive strategies for the conservation of it's natural environment.

Despite geographic location, audiences tend not to pay attention to, or understand, interpretation that does not relate[2] to their personal experiences (Ham, 1983; Tilden, 1977). Therefore, it is important that an interpreter knows the audience and is able to relate a program to that specific audience (Derr, 1974; Jonhson & Field, 1984). Understanding an audience does not mean that interpreters simply look at general

[2] Relate is one of the five principles of interpretation; see (Tilden, 1977).

characteristics such as age, gender, and education. Interpreters need to find out and reveal what the audience wants and expects, so that they can deliver a program that fulfills these expectations. When a program does not meet expectations, the participants will not be satisfied with the experience (Driver & Tocher, 1974).

The United States' concept of environmental interpretation, as an on-site educational effort geared to visitor populations, seems to enjoy widespread acceptance in the developing world. The audiences that might be targeted, and the communication approaches that might be used to reach them, seem less clear when differences between countries are examined (Ham, Sutherland, & Meganck, 1993).

Therefore, it is crucial to carry out studies about the Malaysian people's perceptions of their natural environments before making any decisions regarding interpretation strategies. The United States model has been successful because of large amounts of land outside protected areas that contain raw materials that support industry and economic development. This has reduced pressures to develop protected lands in the United States. In many developing countries, including Malaysia, major areas of uninhabited lands are scarce or absent and pressures are mounting to exploit those that remain for economic growth (Mackinnon, MacKinnon, Child, & Thorsell, 1986; McNeely, Miller, Reid, Mittermeier, & Werner, 1990).

Any attempt to create interpretive models in Malaysia, should be based on local conditions. Only then, we can develop and provide the most effective interpretive strategies that will communicate general environmental messages and that will show the critical link between "quality of life" and the quality of the environment. Changes are expected occur in human behavior toward the environment once an understanding of link between quality of life and the environment is established through interpretation and education.

Study Objectives

The objectives of this research include:

1. to develop a descriptive profile of the four adopter groups,
2. to discriminate the four adopter groups across predictor variables that will best explain the group differences and validate the self-reported adopter group memberships, and
3. to compare the four adopter groups across various dependent variables related to environmental issues on values, importance of natural resources, and quality of life principles.

Background on Malaysia: People and Natural Resources

Established in 1963, the Federation of Malaysia is comprised of 11 states in Peninsular Malaysia (formerly the Federation of Malaya[3], which became an independent country in 1957) and the two Borneo states of Sabah (formerly North Borneo) and Sarawak. Singapore was part of the Federation until 1965, when it became an independent republic.

Malaysia is a constitutional monarchy. The monarchy is unusual in that the King (Yang Dipertuan Agong) is selected for four years by the hereditary state rulers and the

[3] Prior to the Malayan Union of 1946 – 1948, British Malaya had a complex political structure comprising the Straits Settlements (Singapore, Melaka, and Pulau Pinang), the Federated Malay States (Perak,Selangor, Negeri sembilan, and Pahang), and the Unfederated Malay States (Perlis, Kedah, Johor, Terengganu and Kelantan). The Union was replaced by the Federation of Malaya, which became an independent state in 1957.

appointed governors of the states of Pulau Pinang, Melaka, Sabah, and Sarawak. Only a ruler can be elected as the King. The country is governed by an elected federal parliament comprising of an upper house, the Dewan Negara or Senate, and a Lower house, the Dewan Rakyat or House of Representatives, and by elected state legislative assemblies. Federal and state responsibilities are set out in the Malaysian Constitution in three lists: the Federal List, the State List and the Concurrent List. The Concurrent List stipulates which subjects may legislate for both the federal government and the state governments. Land, forestry, agriculture, and mining are on the State List, which has considerable significance for conservation and environmental management. States are reluctant to designate their land for National Parks or any type of national preserve that will be nationally gazetted because then the state will loose all rights to the land. States will no longer have the option to revert the status of the land for activities such as mining, logging, agriculture or development projects. Since the states have all of the above mentioned land use rights, they tend to gazette natural areas as state parks, which the states can later de-gazette for other land uses that suits the states interest at any given time.

Malaysia is a prosperous country with an excellent network of roads and a good railway along the peninsula's West Coast. Industry and urban population are concentrated on the peninsula, particularly along the West Coast, while East Malaysia is dominated inland by the country's characteristic impenetrable jungle. The World Bank classifies Malaysia as an upper-middle-income developing country. The GNP per capita in 1996 was US$ 4,370 (CIA, 2000). Malaysia's per capita income is second in Southeast Asia only to neighboring Singapore. Some 40 percent of Malaysians live in townships of more than 5,000 inhabitants. Malaysia's mortality rate of seven per 1,000 is one of the lowest in the world.

Over the centuries, the country's prosperity has come from its coastal plains, wider on the west than the East Side of the peninsula. Malaysia rose first as a trading point for Asia and Europe, with ports of Melaka (Malacca in colonial times) and later Singapore, now sovereign and independent. Then came tin mining and rubber plantations, and more recently, palm oil, hardwood timber, offshore petroleum and gas. Rice paddies in the northwest near the Thailand border and around river deltas on the East Coast serve only domestic consumption.

The characteristic natural vegetation of Malaysia is tropical rain forest. Both peninsular Malaysia and East Malaysia form part of an extensive rain forest block that is centered on the Malay Archipelago[4], with a distinctive botanical region called Malesia[5]. In Malaysia, there are many different rain forests, depending on factors such as edaphic conditions, drainage, and altitude. Below an elevation of about 750 m, there are species rich lowland and hill Dipterocarp-dominated forests in dry land areas and mangrove, peat-swamp, and freshwater swamp forests in wetland areas. Lower montane and upper montane rain-forest formations occur above 750 m and 1500m respectively. Above 1200 m, oak-laurel dominated forests replace the upper dipterocarps.

Even though Malaysians have resolutely moved into the modern age, they have not lost all contact with more traditional values, which has contributed to her fascinating culture. Malaysia with a population of 21,793,300 (July 2000 estimate) (CIA, 2000) has

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[4] Malay Archipelago refers to the great chain of islands (together with the Malay Peninsula, the narrow extenson on the Asian mainland south of the Kra Isthmus) extending from Sumatera in the west to beyond New Guinea in the east (Wallace, 1869).

[5] In order to avoid confusion with (political) Malaysia, this Latin transliteration was first introduced in the mid-nineteenth century and was reinstated in the 1960's to describe the botanical region (Steenis, 1981).

the best of both worlds: the creature comforts inherent in and affluent country, as well as the untamed wilderness of its tropical rainforests. Almost 70 percent of her population lives in either big cities or townships.

Peninsular and East Malaysia together cover a total land surface of 329,759 square km (127,317 square miles). From the Thai border to the causeway across to Singapore Island, the peninsula is 750 km (470 miles) long and about 350 km (218 miles) at its widest point. It is two-thirds the size of East Malaysia, which spans the north Borneo coast, embracing the enclave of the Brunei Sultanate and bordering on the Indonesian Kalimantan to the south (see figure 1).

Rain forest covers approximately four-fifths of Malaysia. Of the countless rivers that crisscross the land, the peninsula's longest are the Pahang (475 km or 297 miles) and the Perak (400 km or 250 miles). In East Malaysia, the longest river is the Rejang (563 km or 350 miles).

On the peninsula, the mountains of the central Main Range rise from 900m. (nearly 3,000 ft) to 2,000m (6,500 ft), the tallest being Mount Tahan in the eastern highlands, at 2,187 m (7,186 ft). However, the country's highest peak, indeed the highest in South-East Asia, is in East Malaysia: Mount Kinabalu, at 4,100 m (13,450 ft).

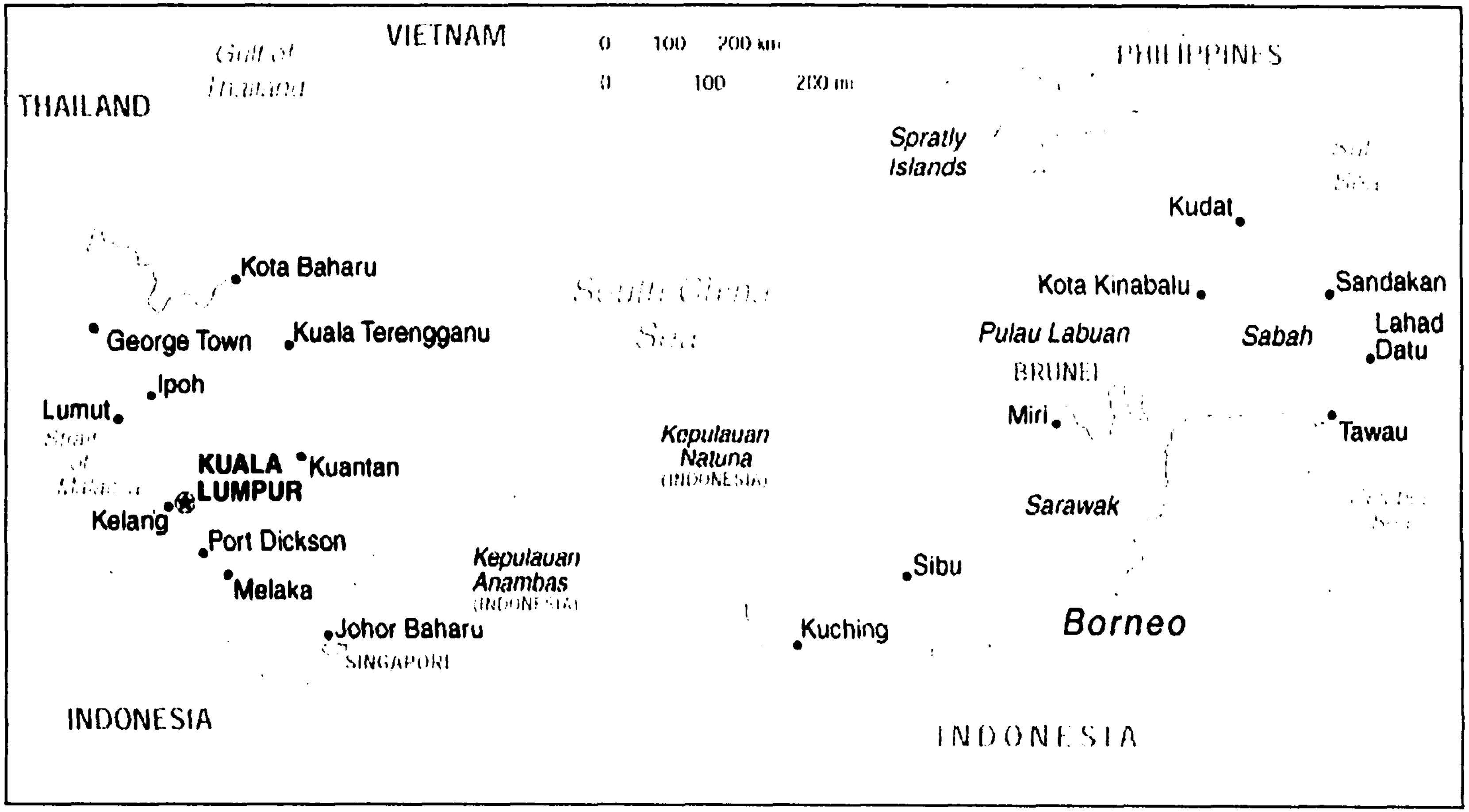

Figure 1. Map of Peninsular and East Malaysia and Neighboring Countries.

Mangrove swamps found in coastal areas, and squat nipa palms give rise to mangrove forest. Untouched by the Ice Age, the world's oldest rainforests engulf low but steeply rising mountain chains which cross the peninsula from east to west, like ribs, with one long north-south Main Chain as the backbone. Until the highway construction of the modern era (94,500 km) (CIA, 2000), access to the jungle interior has been, primarily by river. Rivers still provide access to the interior. The riverbeds are mostly too shallow for anything but flat-bottomed boats, drawing aboriginal communities to settle along the riverbanks.

In Sabah and Sarawak (east Malaysia), plantations alternate with marshland on the coastal plain and give way to the great forest interior of the island of Borneo. Sandbars at the mouth and rapids upriver hinder navigation there, though small sea-going vessels can make fair headway up the Rejang in Sarawak and up the Kinabatangan in Sabah.

With the growth of tourism as a major industry, resort facilities have burgeoned in smaller islands such as Penang and Langkawi on the west coast of the peninsula, Tioman on the east coast, and around Sabah's offshore nature reserves.

In an era of seemingly perpetual ethnic hostilities all over the world, Malaysia can be proud of the coexistence of the three most prominent peoples of Asia, which includes Malays (60%) (mostly Muslims), Chinese (32%), and Indians (8%) (CIA, 2000). The people of Malaysia live in a remarkable state of harmony, avoiding most of the violence that characterizes other mixed societies around the world. It is common to find, as in old Melaka, Buddhist and Hindu temples on the same street as a mosque. This makes for a marvelous diversity of national cuisine, with food centers often serving Malay, Chinese, and Indian dishes at adjacent dining areas.

Malays are the major constituents when it comes to Malaysian politics and policy developments. Sixty percent of the Malaysian population consists of Malays. They are the key stakeholders when it comes to natural resources. Malays primarily live near natural areas and they are the ones who use the natural areas for food, medicine, and building materials.

The State Of Kedah

The state of Kedah, one of the oldest states in Malaysia, is located at the Northwest corner of Peninsular Malaysia, bordering Thailand (see figure 2)(BHC, 1999). Kedah is a constitutional monarchy headed by the state Executive Council that is headed by the chief minister. Kedah has a total land size of 9,425 square kilometers (3,639 square miles).

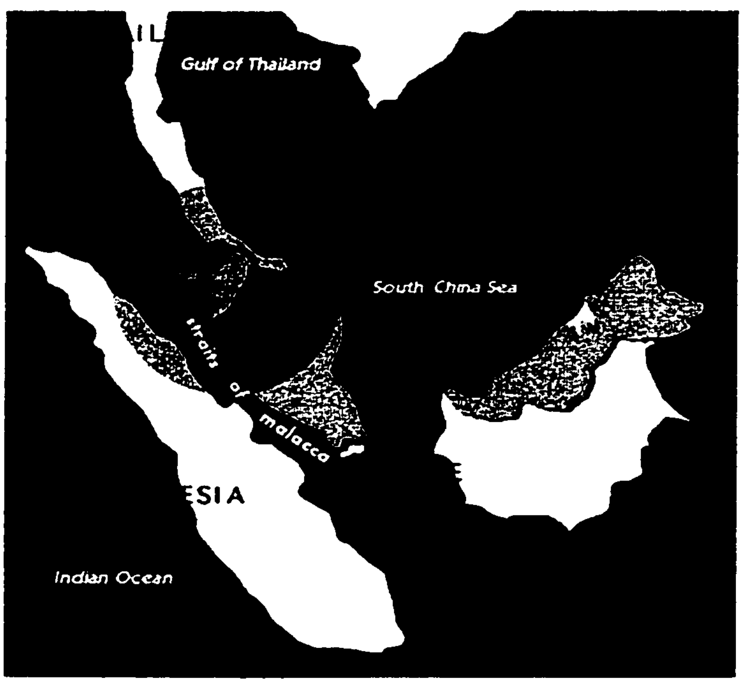

Figure 2. Location Map for Kedah State

It is divided into eleven districts named: Kota Setar, Padang Terap, Kubang Pasu, Langkawi, Pendang, Yan, Kuala Muda, Sik, Kulim, Bandar Baharu and Baling(BHC, 1999)(see figure 3).

Alor Setar is the state capital and administrative center for Kedah. The total population of Kedah is approximately 1.4 million, comprised of 71.8 % Malays, 18.6% Chinese, 7.8 % Indian and 1.8 % other races (Kedah, 1996). About half the population of Kedah is 21 years of age or older (UN, 2000). Kedah is very much a Malay state and the people of Kedah are generally paddy (rice) planters with most living in kampungs[6] next to their fields.

Kedah is known as the "rice bowl of Malaysia" for being the biggest producer of rice. However, Kedah is currently moving toward becoming an industrialized state whereby the state government has embarked on setting up industrial areas throughout the state. The state government also promotes tourism and diversification of the agricultural sector to make it more commercialized.

The terrain of Kedah is flat with kampungs (villages) scattered over rice fields, which include traditional Malay houses with coconut palms, and local fruit trees such as mango, guava, rambutan, papaya, and banana. Gunung Jerai, with a height of 1,200 meters, is the highest mountain in the state and the Northern region of peninsular Malaysia (MTPB, 1997).

[6] Kampung is traditional Malay Village, houses built on stilts.

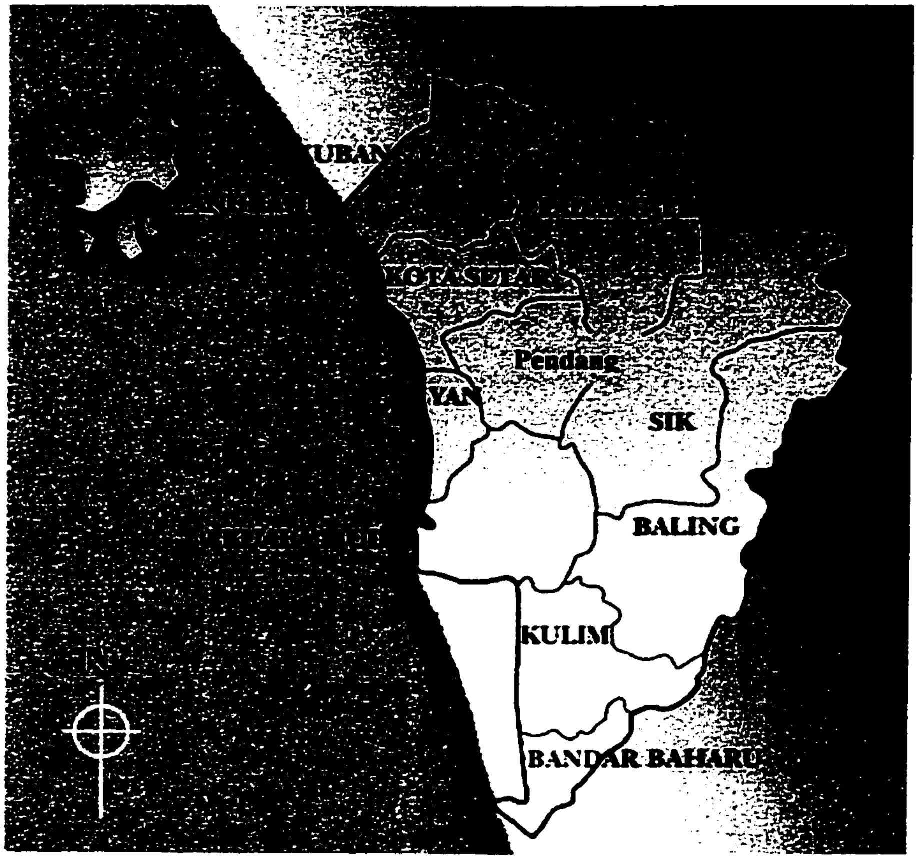

Figure 3. Map showing the 11 Districts in the State of Kedah

Malay People

The Malays are considered the indigenous people of Malaysia even though historical evidence suggests that they were not the earliest inhabitants of the area. The ancestors of the Malay people came to Southeast Asia in prehistoric times, probably migrating from Indo-China or Yunan over 3,500 years ago (Harrison, 1964; Tweedie, 1953; Winstedt, 1953). The Malays then gradually settled in the coastal parts of Malaysia and the fertile agricultural lands, while the various existing aboriginal peoples of Negrito and Austroloid-Veddoid ethnic strains retreated into the interior mountains and dense jungle areas where they have survived until today and still perpetuate their less technically oriented cultures (Cole, 1945; Means, 1970). Some of the old tribes have died out; some have adopted the life of the Malays, others have retained their own language and their primitive culture, and are found in many interior parts of Malaysia (Aiken & Leigh, 1995; Crosby, 1986; Wilkinson, 1971).

Malaysia is a multiracial, multi religious country in which Islam dominates politically and culturally. Islam has been adopted as the state or official religion. Islam has been promoted as central to Malaysian identity. Malaysia has taken pride in, and economic advantage of, its place in the broader Islamic community. A Malay person is and must be a Muslim[7]. To abandon Islam would mean the renunciation of his or her Malay way of life (for the two are intertwined) and the loss of all legal and political privileges afforded to all Malays based on their claim of being indigenous people[8]. In Malaysia, Islam gives the Malay people bonds of communal identity as strong as those developed by social or religious institutions. For the Malay, the sense of community is inextricably bound up with the concept of the community of true believers. *Masok Melayu* is the common term used to denote conversion to Islam. In rough translation, it means, "to enter the Malay community". Malays have a strong sense of racial identity re-enforced by Islamic attitude toward the infidel. Islam as practiced in Malaysia today, has adapted well to global modernization. It is generally agreed that Islam has been flexible and adaptable to much economic and social change and has been capable of a working synthesis of traditional and modern values.

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[7] Malaysia, The Federal Constitution Act. 160 (2)

[8] Islam is the official religion of Malaysia. In Malaysia the administration of Muslim affairs rests with the Council of Religion, the State Department of Religious Affaires and the system of religious courts. In most cases the highest Muslim official is the *Mufti* who is responsible for preserving the orthodoxy and has the power to issue *fetuas*, which are legally binding interpretations of the Islamic law or doctorine. By law no one may teach or espouse " unorthodox" doctrines or religious beliefs among Muslims. Islam is supported by regular state and federal funds, and by *zakat* and *fitrah* alms taxes which are levied on all Muslims (Means, 1956, 1969).

<u>Definition of terms</u>

Diffusion of innovation

Diffusion of innovation is a conceptual model that is used to understand social change. The word "diffusion" is defined by Rogers (1995) as "the process by which an innovation is communicated through certain channels over time among the members of a social system." Innovation is " an idea, practice, or subject that is perceived as new by an individual or other unit of adoption. An innovation presents an individual or an organization with new alternative or alternatives, with new means of solving problems" (Rogers, 1995).

Segmentation

Segmentation is a strategy that divides people into homogenous subgroups based on certain defining characteristics. In commercial marketing, for instance, advertising and products can be tailored and designed to meet special needs, interests, and desires of targeted groups. In social marketing, on the other hand, audience is segmented so messages can be designed with specific attitudes, behaviors, preferences, and patterns of media use.

Adopter categories

According to Rogers (1995), adopter categories fit a normal distribution curve on an innovation by time graph. The adopter categories begin with "innovators," followed by "early adopter," "early majority," "late majority," and ends with the "laggard" category. Each of the homogenous groups has its own unique characteristics as described by Rogers (1995).

Discriminant analysis

Discriminant function analysis is a technique that allows the researcher to simultaneously examine and describe differences between two or more mutually exclusive groups with respect to several continuous variables.

Limitations of the study

1. Very few reference materials that dealt with diffusion issues in Malaysia were available for use in the study.

2. Direct translations of the measurement scales from English to Malay were at times very difficult and some bias might have been introduced during these conversions. The numerical translations of the scales were identical but their corresponding words were modified when they were translated into Malay. This was to assure that the respondents were actually answering the questions as intended by the survey instrument.

3. This study only looked at the one ethnic group, the Malays, in Kedah. There other major ethnic groups in Malaysia, which include the Chinese, Indian, Iban, Bidayuh, and Kadazan.

4. This study looked at general measures of environmental issues and not specific environmental innovations.

CHAPTER II

THEORETICAL FRAMEWORK

This chapter reviews the literature on audience segmentation, diffusion of innovation, conservation in Malaysia, and cultural differences between Asians and Westerners. The literature review will be followed by the proposed theoretical framework and study hypotheses.

Audience Segmentation

This section provides basic information regarding the various elements of segmentation. The researcher suggests that market segmentation is no different than the strategy of audience segmentation carried out in this study. Whether it is marketing some type of product or marketing conservation ideology and knowledge, segmentation provides managers with important information about their audience in each homogeneous segment.

Note that segments are not homogeneous groupings of the target audience naturally occurring in the market place. Market segments are determined by the marketing manager's strategic view of the market. Segments are groups of customers to whom an organization may offer a single marketing mix of products to maximize success in meeting its long term goals..

Smith (1956) introduced segmentation in a seminal article as it was related to marketing. In this article, Smith contrasted market segmentation with product differentiation where he claimed that product differentiation attempts to bend demand to the will of supply. Product differentiation uses advertising and promotion to distinguish a product from competing products and, as a result, to increase demand and reduce competition for that product (Smith, 1956).

Market segmentation, in contrast, works from the demand side of the market, the consumer. Segmentation bends supply to demand by identifying lucrative segments of the market and developing products to fit those segments (Walters & Robin, 1956).

Identifying homogeneous segments and understanding their characteristics based on different management purposes would facilitate the delivery of effective products to the audience. Market segmentation is one component of a broader strategy of an organization, which is known as the "four P's of strategic marketing": probing (marketing research), partitioning (segmentation), prioritizing (selecting the target segments), and positioning (pinpointing the options in each target segment) (Kotler, 1989).

Segmentation at the very basic level is simply the classification of people into homogeneous groups or segments. It is the process of dividing the market or audience based on differences and forming smaller subgroups based on common characteristics (e.g., age, gender, and income). Groups will have both differences and commonalities. According to Levitt (1986), segmentation had become a powerful organizing principle in modern businesses and he went on to say that if one was not thinking segments, then one was not thinking.

Segmentation strategies have been heavily used in the marketing of products to consumers. Market segmentation results from a determination of factors that distinguish a certain group of consumers from the overall market. The challenge of implementing effective segmentations lies in determining which differences and which similarities are important in helping an organization achieve its marketing objectives. The ideal segmentation strategy maximizes differences within each segmentation in terms of criteria of interest (Levitt, 1986).

Classifying consumers in this way can help manufacturers and communicators to adjust their advertising, marketing, distribution channels, and prices to reach target markets more effectively (Gunter & Furnham, 1992). Since the concept of market segmentation emerged in the late 1950s, it has been one of the most researched topics in marketing literature (DeSarbo & Cron, 1988; Frank, Massy, & Wind, 1972; Kamakura & Russell, 1992; McDonald & Dunbar, 1995; Wedel, 1995). The researcher feels that there is very little difference, if any, between audience and market segmentation because both deal with segmenting people into homogenous groups using various bases. In the early applications of market segmentation researchers used "observable general bases" like cultural variables, geographic variables, neighborhood, geographic mobility, demographic and socio-economic variables, postal classifications, household life cycle, household and firm size, standard industrial classifications, and socioeconomic variables when trying to market consumer products(McDonald & Dunbar, 1995; Wedel & Kamakura, 1998).

The segmentation variables which are "unobservable general bases" fit into three groups including (1) personality traits, (2) personal values, and (3) lifestyle (Gunter & Furnham, 1992). Marketers developed these psychographic segmentation bases extensively in the 1960s in response to the need for a more lifelike picture of consumers and a better understanding of their motivations (Wedel & Kamakura, 1998).

Frank, Massy, and Wind (1972) wrote the leading reference book on market segmentation, where they first distinguished the two major dimensions of segmentation research. The two dimensions are bases and methods, and they provided a comprehensive description of the two dimensions, which was state of the art at that time. They also classified research on market segmentation into two schools based on their theoretical orientation. The first school has its foundation in microeconomic theory, whereas the other is grounded in the behavioral sciences (Frank et al., 1972).

Segmentation is often referred to in two ways: explicitly, with concepts such as market segmentation and implicitly, with concepts such as target marketing, niche marketing, target groups, and demographics. Recent studies showed that information campaigns could only succeed when specific conditions are met, which had been ignored in previous campaigns (Grunig, 1989). The most important of these conditions was the requirement that campaigns be directed to carefully selected segments of the mass audience (Grunig, 1989).

> According to Mendelsohn (1973, p. 55), "An impressive fund of data gathered over the past thirty years indicates the publics who are most apt to respond to mass-mediated information messages have prior interest in the subject areas presented. As a consequence, information directed this segment of potential audience requires a totally different communication strategy and tactics, from information that is to be disseminated to an audience that is initially different. At the very least, communicators who intend to use mass media to produce information gain, or attitude and behavior modification, must realize that their targets do not represent a monolithic mass, although the media they may decide to utilize have the potential of reaching high population aggregates."

Since segmentation is essentially a grouping task, there is a large variety of methods available that have been used (Wedel & Kamakura, 1998). The methods used in segmentation research can be classified in two ways. First, they can be classified into a-priori and post-hoc approaches (Green, 1978; Wind, 1978). A segmentation approach is known as a priori when the type and number of segments are determined in advance by the researcher and post hoc when the type and number of segments are determined on the basis of the results from data analyses (Wedel & Kamakura, 1998).

According to Wedel (1998), the second way to classify segmentation approaches is according to whether descriptive or predictive statistical methods are used. Descriptive methods analyze the associations across a single set of segmentation bases with no distinction between independent and dependent variables. Predictive methods analyze the association between two sets of variables, where the independent variable(s) predict the dependent variable. In addition, there are hybrid forms of segmentation that have been used in segmentation approaches that combine both the a-priori and post-hoc procedures (Wedel & Kamakura, 1998).

Post-hoc Predictive Methods

Post-hoc predictive methods identify segments based on the estimated relationship between a dependent variable and a set of predictors (i.e., independent variables). The segments formed by post-hoc predictive methods are homogeneous; that is the relationship between dependent and independent variables is the same for segments produced by predictive methods (Wedel & Kamakura, 1998). The traditional method for predictive clustering is known as "automatic interaction detection (AID). The AID method identifies interactive effects of categorical segmentation bases on a dependent variable (Assael, 1970; Assael & Roscoe, 1976). This method AID splits a sample into groups that differ maximally according to a dependent variable on a set of independent variable. The AID method was generalized to handle multiple dependent variables (MAID) (MacLachlan & Johansson, 1981) and categorical dependent variables (CHAID) (Kass, 1980).

Conjoint analysis is useful in post-hoc predictive segmentation because, in marketing studies, it allows for grouping of consumers according to how they respond to product features in making choice decisions (Wedel & Kamakura, 1998). Componential segmentation involves an extension of conjoint analysis in which both product profiles and respondent profiles are considered (Green, 1977; Green & DeSarbo, 1979)

Segmentation Models

Grunig's Nested Model: Although audience segmentation models are usually heuristic, there are notable exceptions. Grunig's (1989) nested model of segmentation is theory based and consists of inner and outer nests as in concentric circles. The inner nests contain individual communication behaviors and effects, and publics. The outer nests consist of: (1) communities, (2) psychographics, lifestyles and subcultures, and social relationships, (3) geodemographics, (5) demographics and (6) mass audience.

Information pertaining to variables in the inner nests is obtained by direct questioning. In contrast, information pertaining to variables in the outer nests can be obtained from sources other than the individual. Variables within the inner and the outer nests are related such that knowledge of one can provide information about the other. Grunig (1989) considers variables in the inner nests as the most useful in segmentation because they provide the most direct and specific information about individuals, thus permitting more precise targeting.

Market-Oriented Ethnographic Segmentation: Market-oriented ethnographic segmentation is not just a method of data collection. It aims at clarifying the way culture is simultaneously constructed and formulated by people's behaviors and experiences (Tedlock, 1983). Ethnography aims to explicate patterns of action that are cultural and /or social rather than cognitive constructs (Sherry, 1990). Ethnography not only establishes the context and emic of experience for particular groups or persons, but it also seeks to convey the comparative and interpreted cultural significance of this experience (Denzin, 1989). Ethnographers study audiences that are grounded in culture, and ethnography employs distinctive methods of data collection and interpretation (Tedlock, 1983).

Ethnography does not express a universal sequence of data collection method. The specific sequence of data collection in an ethnographic project is dictated by the nature of the phenomenon, such as complexity, ubiquity, frequency, duration, the researchers' prior experience, degree of conceptual understanding, and the research questions that emerge during the research process (Sherry, 1990).

Four distinctive features guide ethnographic research. First, ethnography gives primacy to systematic data collection and recording of human actions in natural settings (Rabinow, 1986). Secondly, ethnographic research involves extended, experiential participation by the researcher in a specific cultural context, referred to as participant observation (Belk, Wallendorf, & Sherry, 1989; Fernandez, 1986). The third feature is that ethnography produces interpretations of behaviors that subjects and the intended audience find credible. The final feature of ethnography involves incorporating multiple sources of data, which is a research strategy long advocated in other social science traditions (Campbell & Fiske, 1959).

Statistical Segmentation: Various statistical methods can be used to cluster an audience into segments. Researchers who attempt to segment their audience based on how the respondents answered the questions commonly use cluster analysis. For example, variables can be analyzed using k-means procedures to create clusters in multidimensional space and to define group membership for each case or subject in one's study. Cluster analytic techniques such as "k-means" procedure are conceptually similar to "Q-factor" analysis or the grouping of individual observation across variables rather than the grouping of variables across observations as in standard factor analysis or exploratory factor analysis.

Although cluster analysis is frequently recommended and used, some critical methodological issues must be addressed. For example the selection of the clustering approach, depending whether we prefer hierarchical or iterative portioning, will make some difference in how the cases are segmented or clustered (Punj & Stewart, 1983). Similarly, how the researcher determines the number and significance of the clusters becomes an important question (Calantone & Sawyer, 1978)? Finally, the issue of evaluating the reliability and validity of the cluster analysis solution needs to be addressed (McIntyre & Blashfield, 1980).

One could use other statistical strategies for the purpose of audience segmentation. These include exploratory factor analysis, confirmatory factor analysis (i.e., linear structural modeling), conjoint analysis, latent structure analysis and discriminant function analysis.

Using Existing Theory: Using existing theory is another appropriate method for segmenting audiences. Existing theories can help one define or segment audience more accurately. First, there needs to be a way to generalize previous findings to the current audience under study. When populations are alike, there should not be any problems in using existing theories directly to partition the audience.

In a health related study, conducted by Slater and Flora (1991), existing theory was used to partition a large group of individuals into seven healthy lifestyle groups. This model (Slater & Flora, 1991) drew substantially from other theories of behavior change, including Bandura's (1986) social cognitive theory and Fishbein and Azjen's (1975) theory of reasoned action.

The Slater and Flora (1991) framework consists of determinants of health behavior including (1) cognitive- health knowledge, (2) attitudes, (3) issue involvement, (4) perceived preventability of disease, (5) perceived risk, and (6) perceived self efficacy. This framework has been labeled a pychographic-segmentation method based on existing theory. This kind of segmentation is invaluable for shaping positioning strategies, product development, and communication decisions.

Diffusion of Innovation

> "One reason why there is so much interest in the diffusion of innovation is because getting a new idea adopted, when it has obvious advantages, is often very difficult. There is a wide gap in many fields, between what is known and what is actually put to use. Many innovations require a lengthy period, often of some years, from the time when they become available to the time when they are widely adopted. Therefore, a common problem for many individuals and organizations is how to speed up the rate of diffusion of an innovation (Rogers, 1983, p.1)."

What is diffusion? Rogers (1995), defines diffusion as the process by which an innovation is communicated through certain channels over time among members of a social system. He goes on to say that diffusion is a special type of communication, in that the messages are concerned with a new idea. Rogers draws four main elements from the definition, they are innovation, communication channels, time, and the social system. Rogers (1995) asserts that these four elements are identifiable in every diffusion research study, and in every diffusion campaign or program. Study of the diffusion of hybrid corn in Iowa by Ryan and Gross (1943) is the most influential diffusion study.Their hybrid corn study included each of the four elements mentioned by Rogers (1995).

According to Rogers and Kincaid (1981), communication is a two-way process of convergence, rather than a one way, linear act, in which one individual seeks to transfer a message to another in order to achieve certain effects.

Rogers (1995) explained that diffusion is a special type of communication, in which the messages are about new ideas. This gives diffusion its special character. He also feels that some degree of uncertainty is involved in diffusion. Samli (1995), talks about how the diffusion of new products and services were adopted in different cultures. The adoption of products and services by individuals is closely related to the culture and simultaneously to the consumer behavior in that culture (Samli, 1995).

Rogers's (1995) meta-analysis of diffusion research traditions revealed that there were 3,890 published studies in various disciplines. These disciplines included anthropology, sociology, rural sociology, education, public health and medical sociology, communications, marketing and management, geography, general sociology, and other traditions. Twelve percent of these studies were in the field of communications and the major types of findings included communications channel by stages in the innovation decision process, characteristics of adopter categories, and opinion leaders in diffusion.

These research traditions revealed eight main types of diffusion research, which were earliness of knowing about innovations, rate of adoption of different innovations in the social system, innovativeness, opinion leadership, diffusion networks, rate of adoption in different social systems, communication channel use, and consequences of innovation.

Diffusion of news, especially about a spectacular event, can be very fast. The reason for this rapidity is that the individual only needs to gain awareness and knowledge of the news-event, while the adoption of a technological innovation consists of the knowledge, persuasion, and implementation stages in the innovation-decision process (DeFleur, 1987).

Innovativeness and Adopter Categories

Individuals within a social system adopt an innovation at different times of the product life (Rogers, 1995). Individuals adopt innovations over a time sequence, so they can be classified into adopter categories based on when they first begin using the new idea but not referred in terms of time of adoption. It would be extremely tedious to keep track of the multitude of categories, so Rogers (1995) supported the idea of use adopter categories consisting of individuals with a similar degree of innovativeness. Rogers (1995) claims that we know more about innovativeness, that is the degree to which an individual or other unit of adoption is relatively earlier in adopting new ideas than other members of a system, than about any other concept of diffusion research. Therefore, innovativeness is a bottom-line type of behavior in the diffusion process (Rogers, 1995).

In the early days of diffusion studies, researchers couldn't agree on a common semantic ground in assigning adopter terminology, which led to a plethora of adopter descriptions. The most innovative individuals were termed as "progressists," "hightriers," "experimentals," "light houses," and "ultra-adopters" (Rogers, 1995). The least innovative individuals were called "drones," "parochials," and diehards" (Rogers, 1995). Today, the adopter categories are more or less standardized across disciplines. The categories start with "innovators," followed by "early adopters", "early majority," "late majority" and end with "laggards," the least innovative individuals.

The adoption of an innovation is normally represented by a normal, bell-shaped curve when plotted over time on a frequency basis. When the cumulative numbers of adopters are plotted, the result is an "S"-shaped curve (see figure 4).

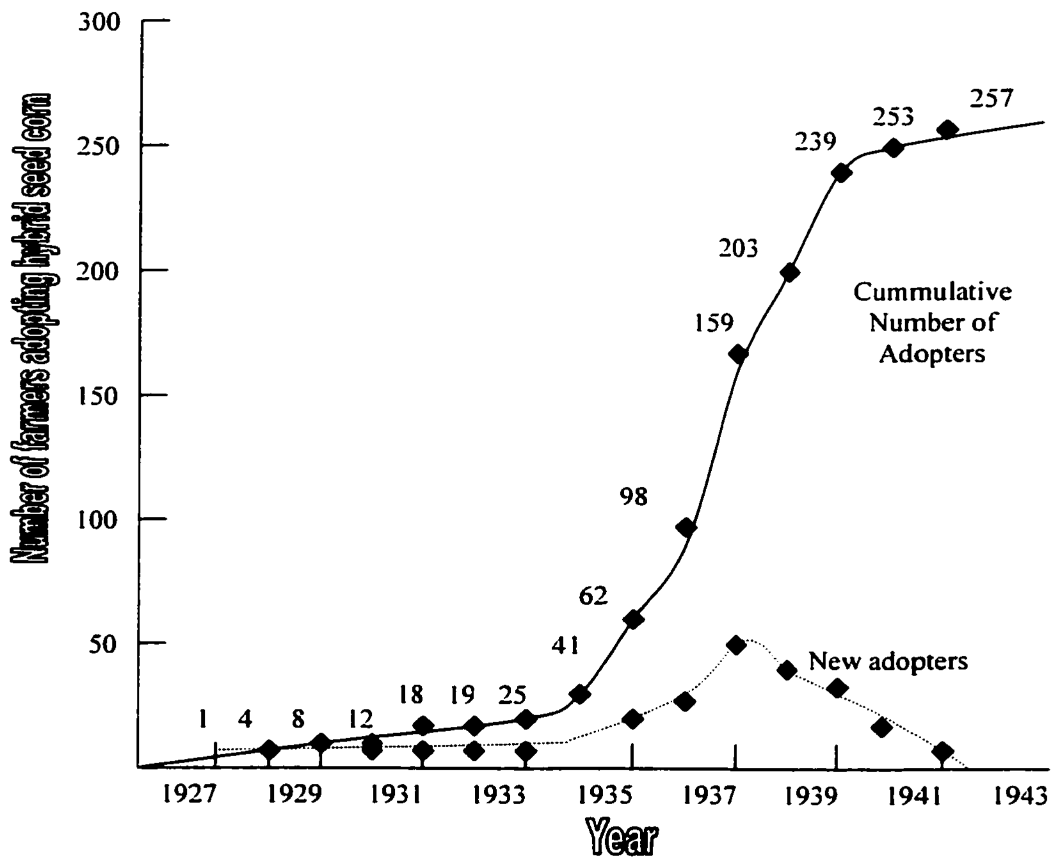

Figure 4. The cumulative number of adopters of hybrid seed corn approaches an S-shaped curve over time, while the frequency distribution of the number of mean adopters per year approaches a normal distribution, bell-shaped curve.
Source: Based on Ryan and Gross (1943)

The S-shaped curve is actually a normal distribution. According to Rogers (1995), most human traits such as weight, height, behavior traits, and intelligence are normally distributed. Hence, a variable such as the degree of innovativeness is also expected to be normally distributed.

All studies carried out in the realm of diffusion suggest that, in time, a product is diffused in the form of a normal curve. The market is normally broken into five groups: innovators (2.5 % of the total market), early adopters (13.5 %), early majority (34 %), late majority (34 %), and laggards (16 %) (see figure 5). Rural sociologists in the United States developed this concept and groups are identified in standard deviations (Cundiff & Hilger, 1988; Robertson, 1971; Rogers, 1983). In a normal curve orientation, two standard deviations indicate 2.5 percent of the populations, and plus or minus one more standard deviation represents the rest of the society (Samli, 1995).

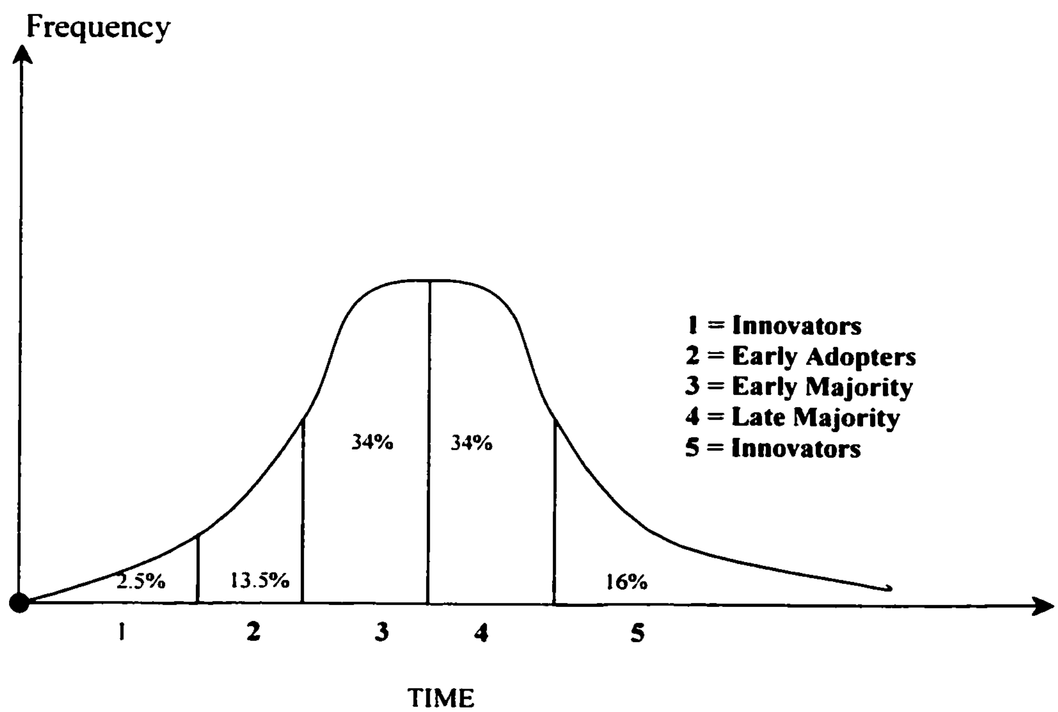

Figure 5. The normal curve with adapter groups

Rogers' (1995) assertion that adopter distribution follows a bell-shaped curve over time, which approaches normality, is supported by investigations of agricultural, consumer, and other innovations in a variety of systems in the United States and in other countries (e.g., Bose, 1964; Rogers, 1958; Ryan, 1948). However, Rogers (1995) demonstrates that not all innovation diffuses in this pattern because of idiosyncrasies or other reasons. For example, he highlights the taboo nature of some innovations. In a taboo situation, innovation may only be applicable to unique groups. He gives the example of adopting safe sex, which might only be applicable to individuals who are at high risk for contracting HIV/AIDS. In a situation such as this, the diffusion curve for the idea of safe sex will not be S-shaped for the entire population.

Adopter Categorization

When attempting to standardize adopter categories, one is expected to determine (1) the number of adopter categories, (2) the portion of the members of a system to include in each category, and (3) on the method, statistical or otherwise, of defining the adopter categories (Rogers, 1995). The criterion for adopter categorization is innovativeness, which is a continuous variable. Therefore, dividing it into discrete groups is a conceptual mechanism, very similar to the way one divides the continuum of social status into upper, middle, and lower classes. If this is the case then a set of categories of groups should be exhaustive by including all the units of a study. The groups must be mutually exclusive by having orthogonal categories. To avoid the problem incomplete adoption of an innovation Rogers (1995) suggests that a series of innovations should be combined into a composite innovative scale.

The five ideal types of adopter categories are mainly based on abstractions made from empirical investigations that were conducted by Rogers (1995). These investigations included various studies conducted over the years by many researchers. The characteristics of adopter categories that follow are all based on Rogers (1995) ideas and compilations from his book entitled, "Diffusions of Innovations."

Innovators

Innovators are very venturesome people who for the most part are interested in new ideas that normally lead them away from a local circle of peer networks and into more cosmopolite[9] social relationships. For the most part, innovators tend to control substantial financial resources that help to absorb possible losses from unprofitable innovations. Innovators must be able to understand and apply complex technical knowledge and be able to cope with a high degree of uncertainty about an innovation at the time of adoption. They are venturesome and willing to accept setbacks from unsuccessful innovations. Innovators tend to import new ideas from outside the system and launch these innovations into the system. Their role as gatekeepers allows many innovations into the system of which other groups may have a chance at adopting the innovations.

Early Adopters

Early adopters are an integral part of the local system, unlike innovators, who spend a lot of time outside their social systems. Early adopters are localities[10], whereas innovators are cosmopolites. Early adopters provide opinion leadership to the system and potential adopters look to them for advice and information about new ideas. They also

[9] Cosmopolite is the degree to which an individual is oriented outside a social system (Rogers, 1995).
[10] Localite is the degree to which an individual is oriented within a social system.

serve as role models for the majority in a social system. It is essential that they make judicious innovation-decisions to maintain the peoples' trust and their role as advisers.

The early adopters decrease uncertainty about a new idea by first adopting it, and then conveying a subjective evaluation of the innovation to near-peers through interpersonal communication.

Early Majority

The early majorities adopt new ideas just before the average member of a system. Although they frequently interact with their peers, they do not hold positions of opinion leadership in a system. This group is an important link in the diffusion process because they are in between the early and the relatively late adopters. Members of the early majority provide interconnectedness in the system's interpersonal networks and they comprise one third of the members of the system. It takes a while, after some time for deliberations, for the early majority to completely buy into and adopt a new idea. They are willing to adopt but not lead others. Their innovative-decision period is relatively longer than that of innovators and early adopters.

Late Majority

This group makes up one third of the members in a system, similar to the early majority, but they adopt new ideas just after the average member of a system. Normally, adoption for this group is based on economic necessity and pressure from peers. They tend to be skeptical and will only be convinced after the weight of the system norms favors an innovation. Peer pressure is a necessary element to motivate adoption and most of the uncertainty about an innovation must be removed prior to their adoption.

Laggards

This group possesses no opinion leadership and is the last in the social system to adopt an innovation. They have the most localite outlook of all adopter categories. They could be considered isolates in the social network system. Laggards tend to be suspicious of innovations and change agents, and their point of reference is the past. They tend to interact with others who also have relatively traditional values. Their innovation-decision process tends to be the lengthiest, with adoption and use lagging behind awareness and knowledge of a new idea. Resistance to innovations on the part of laggards may be entirely rational from their perspective because of their limited resources. Furthermore, they have to be certain that a new idea will not fail before they decide to adopt it.

Characteristics of Adopter Categories

Rogers' (1995) summary of variables related to innovativeness was based on hundreds of studies, and it will be discussed under three main headings. The headings are socioeconomic status, personality values, and communication behavior.

Socioeconomic Characteristics

According to Rogers (1995), from the more than 228 studies he reviewed, earlier adopters are not different from later adopters in age, in most cases. However, there were some evidence that showed earlier adopters to be younger, and other studies that indicated they were older, so age has varied between these groups (Rogers, 1995).

Earlier adopters are more likely to be literate and have more years of formal education than later adopters. Earlier adopters also have higher social status as compared to the later adopters. Variables such as income, level of living, possession of wealth, occupational prestige, and self-perceived identification with social class can be used as indicators for social status.

The upward social mobility of earlier adopters is greater than the later adopters and earlier adopters tend to move in the direction of still higher levels of social status. It is possible that earlier adopters are using adoption of innovations as the means to increase their social status. Socioeconomic status and innovativeness are related. The question that needs to be answered is "Do innovators innovate because they are richer, or are they richer because the innovate?"

Personality variables

Rogers (1995) points out that personality variables associated with innovativeness have not yet received full research attention because of the difficulties in measuring personality dimensions in field interviews. Earlier adopters have greater empathy than later adopters. Earlier adopters might be less dogmatic than later adopters. Dogmatism is the degree to which an individual has a relatively closed belief system, where a set of beliefs is held very strongly. Therefore, a highly dogmatic person would not welcome new ideas but instead prefer to hold on to the past.

The ability to deal with abstraction seems to be a strong trait of the earlier adopters. Innovators are able to adopt new ideas largely based on rather abstract stimuli. Later adopters need less ability to deal with abstractions because they can observe their peers, who have already adopted new ideas.

Earlier adopters tend to have greater rationality than their peers, the later adopters. To be rational is to use the most effective means to realize a given end. Earlier adopters have greater intelligence (Rogers, 1995), have a more favorable attitude toward change, and are better able to cope with uncertainty compared to later adopters.

Earlier adopters have a more favorable attitude toward science than later adopters because most innovation originates from scientific development. Therefore, it is logical that innovators favor science more than the later groups. Earlier adopters tend to aspire more than later adopters, especially in formal education and occupations.

Fatalism is the degree to which an individual perceives a lack of ability to control his or her future. Earlier adopters are less fatalistic than later adopters. A person is more likely to adopt an innovation if the person is efficacious and believes that he or she is in control. The later adopters tend to think that the future is determined by fate.

Communication Behavior

Earlier adopters are more highly interconnected through interpersonal networks in their social systems, and they have more social participation than the later adopters. Earlier adopters are more cosmopolite than later adopters. Innovators tend to travel widely and their interpersonal networks are more likely to be outside, rather than within their social system. Earlier adopters have more change agent contacts, greater exposure to mass media and interpersonal communications channels, and have a higher degree of opinion leadership than later adopters do. Earlier adopters tend to seek information about innovations more actively than later adopters.

Conservation in Malaysia

About 2000 years ago the lure of gold, tin, and the riches of the forest and the sea brought Arab, Indian, and Chinese traders to the regions of the Malay peninsula (peninsular Malaysia today) and the coasts of Borneo. These early maritime kingdoms and empires drew much of their wealth from the abundant harvest of natural resources. The aroma of the legendary Spice Islands and the ineffable super abundance of plant and animal life in the luxuriant forests of the Malay world conjured up western images of an opulent and plentiful east. These natural treasures inspired some of the earliest scientific studies of tropical nature, including those conducted by the renowned naturalist Alfred Russel Wallace (Aiken & Leigh, 1995).

The British ruled Malaysia prior to 1957 and were motivated by the desire to control and exploit Malaysia's natural resources. Malaysia's natural wealth is still being exploited today, but this time by local governments. There is a heavy reliance on the production of tropical timber, which means great wealth for a select few and great struggles for conservationists.

Saving natural resources for future consumption is conservation (Passmore, 1980). According to Aiken and Leigh (1995), "conservation is a point of view, a state of mind, perhaps an emotive call to action; it implies a particular view of land and life. Human well being depends on conserving living resources and the diversity of life on earth." "Conservation of living, renewable natural resources, such as forests, is the aspect of management which ensures that utilization is sustainable and which safeguards the ecological processes and genetic diversity essential for the maintenance of the resources concerned." This is the position espoused by the World Conservation Strategy (IUCN/UNEP/WWF, 1980).

Much has been written about conservation and sustainable development, both locally, on Malaysia and on other tropical areas throughout the world (Aiken & Leigh, 1995; Allen, 1981; Bartelmus, 1986; Dasmann, 1984; Eckholm, 1982; Fitter, 1986; IUCN/UNEP/WWF, 1980; Klee, 1980; McNeely & Pitt, 1985). The strategy for the conservation of living resources such as Malaysia's rain forest means doing three things: (1) maintaining essential ecological processes and life support system, (2) preserving genetic diversity, and (3) utilizing species and ecosystems sustainably (Allen, 1981; Fitter, 1986; IUCN/UNEP/WWF, 1980).

According to Aiken (1995), sustainable development requires the practice of conservation in all places at all times, the two are mutually reinforcing. Conservation that is confined to only parks and reserves, which increasingly resemble islands in a sea of humanized landscape, will not be enough to protect the biodiversity, genetic resources, and the integrity of ecosystems (Dasmann, 1984). In addition, there is an urgent need to devise and adopt sustainable systems of land use for the vast areas of forest and cleared land that exist outside specially protected natural areas (Dasmann, 1984).

Internationally, Malaysia is a signatory of both the "World Heritage Convention" and the "Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)." Malaysia has sought solutions to environmental problems through various legislations and environmental laws (Eccleston & Potter, 1996; McDowell, 1989). Some of the more important pieces of legislations about conservation are the 1972 Protection of Wildlife Act (Act No.76), the 1980 National Park Act (Act No.226), the 1984 National Forestry Act (Act No.313), and the 1974 Environmental Quality Act (Act No.127) (Aiken & Leigh, 1995; Aiken, Leigh, Leinbach, & Moss, 1982).

Malaysia has many NGOs with environmental interests. Some of the more popular environmental NGOs that operate in Malaysia are the Consumers' Association of

Penang (CAP), "Sahabat Alam Malaysia" (Friends of the Earth Malaysia, generally known as SAM), the World Wildlife Fund of Malaysia (WWFM), and the Malayan Nature Society (MNS) (Eccleston & Potter, 1996; Edgar & Shebbeare, 1961; Myers & Myers, 1983; Woon & Lim, 1990). All of the NGOs are urban-based and in the West Coast of Peninsular Malaysia because this is where human impacts on the environment are most apparent. According to the Fifth National Plan of Malaysia, the federal government will attempt to promote greater environmental awareness among the public, public interest groups, and the private sectors (Malaysia, 1986). Environmental NGOs have had difficulty lobbying the local government to change or modify any government policy dealing with the environment. NGOs have been clearly warned by the local government against "interfering" in government policies (Barraclough, 1984; Das, 1982a, 1982b; Gurmit Singh, 1984; Segal, 1983), to the extend that a few NGO activists have been imprisoned without trial under the "Internal Security Act (Hanbury-Tenison, 1990).

Cultural Differences: Asian versus Western

The audience in this study will be equated to consumers at the market place. They are consumers of environmental conservation knowledge/ideologies. Managers of natural resources are the sellers of the ideas and knowledge. The literature on culture will be looked at from the perspective of consumers in general.

Culture is the configuration of learned behavior and results of behavior whose component elements are shared and transmitted by the members of a particular society (Linton, 1945). Culture is transmitted and created content and patterns of values, ideas, and other symbolic-meaningful systems; these values and meaning shape human behavior and the artifacts produced through behavior (Kroeber & Parsons, 1958). Culture is the sum of learned beliefs, values, and customs that create behavioral norms for a given society (Yau, 1994). Beliefs refer to accumulated feelings and priorities that individuals have about things and possessions.

These definitions hold out two important aspects of culture. The first is that members of a given society share culture and the second is that culture is dynamic and transmissible. Sources of culture include nationality, language, political system, education, profession, group (ethnicity), religion, family, gender, and social class (Usunier, 1996). Consumer behavior scholars agree that cultures create behavioral norms and that therefore knowledge of cultural contexts allows one to predict, to some extent, the actions of those people in that culture (Markin, 1974).

An understanding of the process and conditions by which different cultures move on the continuum can help to understand and predict the circumstances under which a given product or idea tends to be accepted in society (Sheth & Sethi, 1977). Without cultural understanding, managers cannot correctly anticipate consumers' reactions to decisions regarding every element of the marketing mix, which includes advertising, positioning, and product features (Schutte & Ciarlante, 1998).

According to Hofstede (1984), there are four underlying dimensions of cultural values: (1) power distance, (2) uncertainty avoidance, (3) individualism / collectivism, and (4) masculinity and feminity. Although these dimensions were originally measured for management and organization practices, they have been used extensively in cross-cultural studies in international marketing (Schutte & Ciarlante, 1998). These dimensions are described below.

Power distance measures the extent to which a society tolerates inequality of power in organizations and in society. Does a given society value equality or inequality in interpersonal interactions? The western culture is more of a "low power distance," where power is relatively equally distributed. The Asian culture is more of a "high power distance," where hierarchy is strong and power is concentrated at the top.

Uncertainty avoidance reflects a culture's tolerance or intolerance of uncertainty. What is the attitude towards risk in a given society? There seems to be no clear difference between the western culture and Asian culture on this dimension. Hofstede (1984) identified countries like Singapore, Hong Kong, Sweden, and the USA as low "uncertainty avoidance," where calculated risk is seen as necessary in order to seize opportunity. Portugal, Japan, France and South Korea were high uncertainty avoidance, where risk is regarded as threatening and to be avoided.

According to Irwin (1996), the cultures in Singapore, Hong Kong, and Malaysia are more tolerant of uncertainty and ambiguity than Japan, Korea, and Taiwan. These differences are related to change and modernization.

The individualism / collectivism dimension encompasses the way in which the self and others are regarded as well as the interaction between them. Do people rely on themselves or the group? The western culture was reported to be individualistic, where self-reliance is valued, as is the need for the individual to satisfy his own needs within the group. The Asian culture was reported to be collectivistic, where dependence is valued, and society expects the individual to subordinate his own needs to those of the group.

The masculinity/femininity dimension of Hoftede's (1984) framework reflects the extent to which the society is dominated by masculine characteristics. To what extent and at whose expense should the weaker members of a given society be cared for? Again, there is no clear western/ Asian cultural difference on this dimension. Scandinavian countries, Thailand, and the Netherlands were reported as feminine, where caring for others and nurturing roles and attitudes are favored. Japan, Switzerland, and Great Britain were reported to be masculine, where personal achievement and assertiveness were favored.

Figure 6 below shows the comparison between Malaysia and USA on the four dimensions of cultural values. On the "power distance scale" (PDI), the higher the index, the greater the comfort with or tolerance of inequality. The higher the index on "uncertainty avoidance index" (UAI) scale, the more uncertain and ambiguous situations were felt to be threatening. The higher the index on the "individual-collectivism" (IDV) scale, the greater the value placed upon individualism. The higher the index on the "masculinity-feminity" scale the greater the value placed upon "masculine" characteristics and behaviors.

	MALAYSIA	USA
Power Distance Index (PDI)	104	40
Uncertainty Avoidance Index (UAI)	36	46
Individualism-Collectivism Index (IDV)	26	91
Masculinity-Feminity Index (MAS)	50	62

Figure 6. Comparison of Hofstede's four dimensions of cultural values between Malaysia and USA. Source: Modified from (Hofstede, 1991)

While there is certainly great variation between the individual Asian cultures themselves, the similarities between Asian cultures along these dimensions and their contrast with Western cultures lead Schutte & Ciarlante (1998) to conclude that collectivistic Asian cultures were indeed fundamentally different from the individualistic western cultures.

Trompenaars' (1993) five value orientation of how we relate to other people further affirms the cultural differences between Asians and Westerners. The values are: (1) universalism versus particularism, (2) individualism versus collectivism, (3) neutral versus affective, (4) diffuse versus specific, and (5) achievement versus ascription. Similar to Hofstede's (1984) underlying dimensions of cultural values, the relative position of individuals along Trompenaars' dimensions indicate the beliefs and behaviors that guide individuals through life (Schutte & Ciarlante, 1998). These dimensions are described below.

The universalism/particularism dimension refers to the extent to which behavior in a society is largely based on rules (universalism) or, alternatively, relationship based on relationships (particularism). Germanic countries lean toward universalism and Asian countries lean toward particularism.

Trompenaars' individualism/collectivism dimension is similar to that presented by Hofstede (1984).

The neutral/affective dimension introduces an additional component to the framework of value orientation, namely the level of emotional expressiveness. In neutral Asian countries, emotions are subdued and expressed indirectly. As for affective Western countries, emotions are expressed freely and directly.

Cultures along the diffuse/specific dimension have also been termed low context/high context societies (Trompenaars, 1993). Asian countries are high context (diffuse) countries where focus is on the context of the situation. Germanic countries are low context (specific) where the focus is on specific issues.

The achievement/ ascription dimension refers to how status is accorded in a society. In Western countries, status and respect are achieved by "doing"(achievement). Status and respect for Asian countries are ascribed by "being"(ascription).

Schutte and Ciarlante (1998) argued that despite the various cultures within Asia, there were many characteristics that were more or less common across many Asian cultures. Secondly, they argue that the cultures found in Asia are to some extent specific to the region and are therefore different from those in the rest of the world, particularly the West. Cultural differences within Asia are less significant than the differences from the world outside Asia (Schutte & Ciarlante, 1998).

The term "Asian values" was popularized by Singapore's former prime minister, Lee Kuan Yew, who attributed the economic success of his country and the other economically strong Asian countries to "Asian values" such as "learning and scholarship and hard work and thrift and deferment of present enjoyment for future gain"(Zakaria, 1994).

Proposed Theoretical Framework

The literature revealed a variety of theoretical perspectives that provided a strong basis and support for the integrity of this study. The perspectives were integrated into the proposed theoretical framework.

There is a need to provide education and information on environmental issues to the people of Malaysia so that they can participate in decision making processes and are able to make informed choices on environmental issues. There is a gap between all the bureaucracies of local governments; the NGO's, whose missions are to stop developments in natural areas and secure more land for conservation; and the Malaysian public. Do the pubic play any role in the decisions of these processes?

In order to get public participation in the management and decision making processes regarding environmental issues, relevant authorities in the country need to inform and educate the public on such matters. Presently it would be difficult to get the public to participate in any decision-making processes or environmental campaigns. This is due to the varying level of knowledge and understanding on environmental issues by the various segments of the Malaysian public. Who are the publics, what are their characteristics, what are their awareness levels on environmental issues, and how can we segment them into groups? It is critical to note that any programs or activities aimed at educating the public on environmental issues must first establish a procedure to understand the audience; in this case, segmentation of the audience was proposed.

A systematic scientific approach was advocated to reveal useful information about audience segments of interest. Therefore, getting information like audiences' personality characteristics, situational issues, demographics, and cognitive characteristics will be important and useful during the planning and implementation of various programs and activities. By segmenting the audience into groups and knowing the characteristics of each group, programmers will be able to design programs and activities that will best suit the targeted segments.

While there is much dispute in philosophy between those who argue for a new environmental ethic and others who claim that we need to change our behavior (Passmore, 1980), most people would agree that we are badly in need of a more caring, sensuous, or passionate involvement with our natural environment. Empowering the public to claim partial ownership for the natural resources in Malaysia would, not only, open up new arenas in the conservation efforts of environmental agencies concerned but also it will give the public opportunities to make informed decisions regarding environmental issues in Malaysia. Once the Malaysian Public begin to understand the uniqueness of the natural resources that surround them, they would begin to appreciate the importance of being actively involved in various aspects of environmental issues.

The importance of reaching out to the public with conservation agendas is acknowledged. However, before managers can implement management plans, they should first learn about their publics' tendencies, knowledge, attitudes and perceptions toward environmental issues. The western world seems to know much more and appreciate natural resource issues in the tropics than the local people in Malaysia. Malaysians need to be exposed to more information and educational materials on tropical environmental issues to increase their awareness and sensitivity toward the natural environment.

Furthermore, as Malaysians progressively feel the impact of economic growth, technological change, and social transformation, values and attitudes toward natural environments are expected to undergo some change. No culture is static. Therefore, it is apparent that there is a need to discover the present status of knowledge, awareness, values, attitudes and importance of natural environments to the people in Malaysia.

The grouping or categorization of people according to their innovativeness and tendencies toward environmental issues would facilitate a better understanding of the group characteristics. Many strategies could be undertaken to achieve audience segmentation. One of the more plausible strategies would be to segment a given population based on existing theories, like the theory of "diffusion of innovation."

The literature describes various multivariate statistics to predict group memberships or segments, but the better method would be to let the people tell the researcher which group they belong to. This can be achieved by asking the people a grounded question that relates to a hypothetical situation that involves an environmental issue. Then, the researcher would obtain responses from the people that will identify their adopter categories.

Rogers (1995) explained the traditional adopter categories to consist of innovators, early adopters, early majority, late majority, and laggards. Rogers (1995) also clearly suggested that investigators should choose the most appropriate categorization of segments or groups. After careful consideration, a four group adopter segmentation classification was decided to be the best option for the study, where the early majority and late majority segments, of Rogers (1995) segments, were combined to become one segment, which will be called the majority segment.

The reason four groups was chosen instead of the traditional five group that is advocated by Rogers (1995) was to facilitate clearer group discrimination and to assure that the alternative actions (represented adopter categories) presented to the respondents were easily distinguishable between categories. The alternative options were based on how the respondents should act towards a hypothetical environmental situation (see question 1A in appendix A). The diffusion characteristics (Rogers, 1995) used in the development of the alternative actions for the hypothetical scenario provided the respondents a clearer picture for the option representing the combined majority group.

Pre-test respondents had difficulties differentiating the alternative actions representing the two groups, which were early majority and late majority. However, when the characteristics of the two groups were combined to form one action representing the majority group, the test subjects responded favorably and were able to clearly differentiate all four actions. Most traditional diffusion studies used the measurement of the rate of adoption of an innovation, which involves the adoption of an innovation over a period. This study will utilize previously identified characteristics (Rogers, 1995) to determine the group membership and classification validation. The key objective of the study is to maximize on group differences and predict the strength of the discriminator variables selected to identify the groups. There is no real concern about the number of categories selected for the study as long as the groups included all cases in the study sample.

The adopter groups were discriminated based on the socioeconomic and personality characteristics as described by Rogers (1995) Test variables included variables with cultural, environmental, social, and awareness contexts.

The Proposed Theoretical Model

The theoretical model proposed for this study (see figure 7) has three main blocks. The first block contains discriminator variables, which are broken down into personality and socioeconomic scales and single item indicators. Block number two, the middle block, is Rogers (1995) modified adopter categories. The final block contains the test variables, which include scales and single item indicators related to value of natural

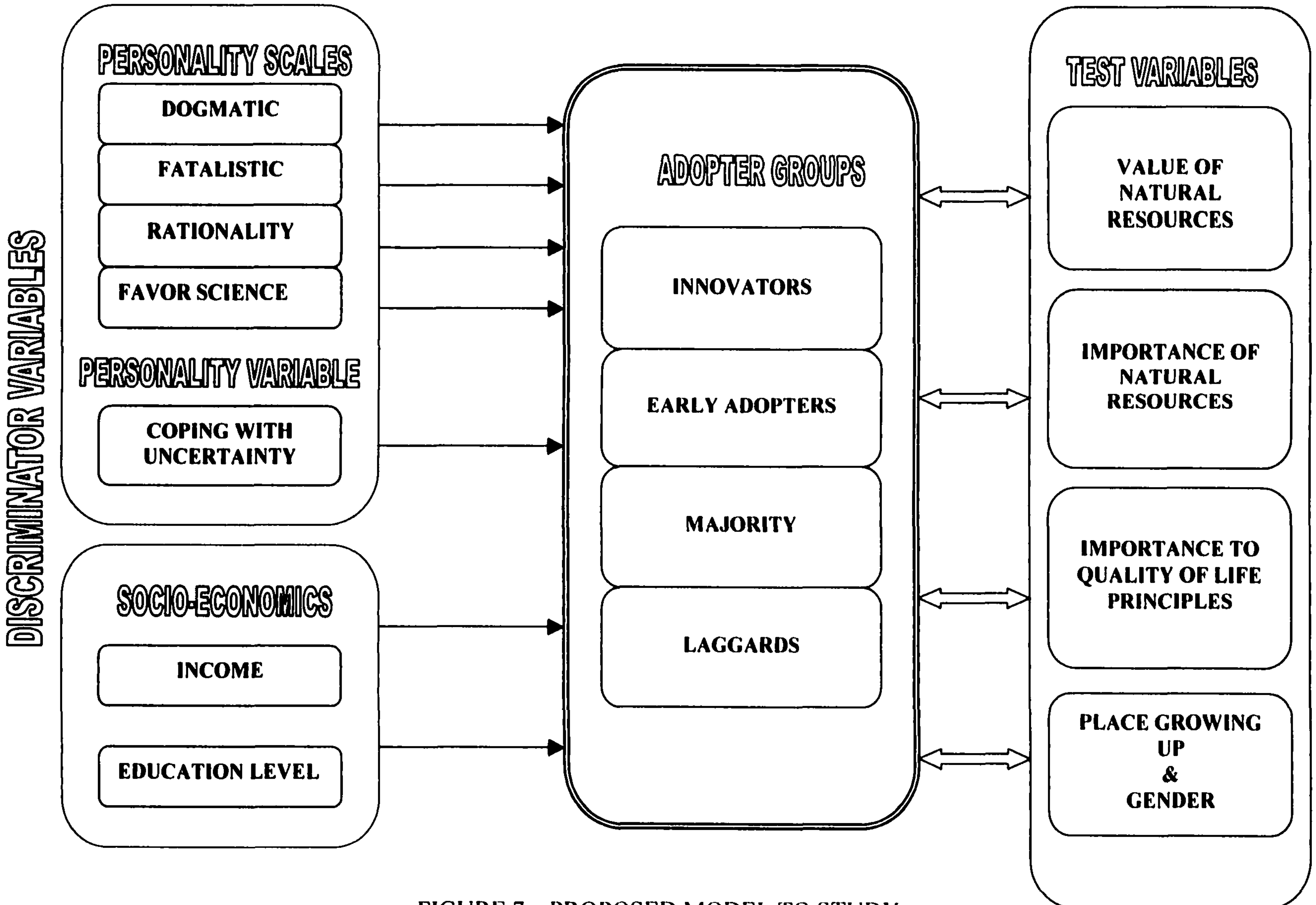

FIGURE 7. PROPOSED MODEL TO STUDY ADOPTER CHARATERISTICS

resources, importance of natural resources, importance to quality of life principles to test items and demographics.

Hypotheses

The adopter groups are named based on their ranking on a time-scale of when the groups adopted an innovation. The earliest to adopt were the innovators and the last to adopt were the laggards. So, in a time continuum, innovators adopted earlier than early adopters, early adopters adopted earlier than the majority, and the majority adopted earlier than the laggards. All the hypotheses listed below are directional hypotheses except for hypotheses 10, 12, 13, 14, and 16 that were hypothesized to have similar group means.

1. Earlier adopters place higher importance on the effects of destruction of natural resources, which might affect their well being, than later adopters.

2. Earlier adopters place higher importance on the effects of pollution of natural resources, which might affect their well being, than later adopters.

3. Earlier adopters place higher importance on the effects of extinction of flora and fauna, which might affect their well being, than later adopters.

4. Earlier adopters place lower importance on the effects of losing agricultural land to natural resources, which might affect their well being, than later adopters.

5. Earlier adopters value natural resources more for enjoyment than later adopters.

6. Earlier adopters value natural resources more for preservation than later adopters.

7. Earlier adopters value natural resources more for income than later adopters.

8. Earlier adopters value natural resources more for conservation of air and water quality than later adopters.

9. Earlier adopters place higher importance on air quality to their quality of life principles than later adopters.

10. Earlier adopters and later adopters place the same amount of importance on family time to their quality of life principles.

11. Earlier adopters place higher importance on clean rivers to their quality of life principles than later adopters.

12. Earlier adopters and later adopters place the same amount of importance on children's education to their quality of life principles.

13. Earlier adopters and later adopters place same amount of importance on transportation needs to their quality of life principles.

14. Earlier adopters and later adopters place same amount of importance on religion to their quality of life principles.

15. Earlier adopters place higher importance on the natural environment to their quality of life principles than later adopters.

16. Earlier adopters and later adopters place same amount of importance on money to their quality of life principles.

17. Earlier adopters place higher importance on recycling practices to their quality of life principles than later adopters.

18. Earlier adopters place higher importance on modern home appliances to their quality of life principles than later adopters.

19. Earlier adopters place higher importance on wildlife to their quality of life principles than later adopters.

20. Earlier adopters place higher importance on wealth to their quality of life principles than later adopters.

CHAPTER III

RESEARCH METHODOLOGY

This chapter presents the procedures used in this research. The first section discusses research design. The second section describes the procedures used for the selection of study area and it provides a general description of the study area. The third section provides information regarding the sampling design. The fourth and fifth sections focus on the survey instrument and data analyses, respectively. Method of data analyses and test statistics used in the analyses are explained in the final section.

Research Design

A one-shot post-hoc field research design was used for this study, **[X ------- O]** (McClintock, 1972). The X normally represents a quasi-experimental manipulation but in this case, it represents a naturalistic treatment and O represents an observation. The manipulation X precedes the observation O. The naturalistic treatment (X) of the respondents was all the events, conditions, values, beliefs, attitudes and other life defining characteristics that they have had or experienced prior to the point of data collection. O represents the observation or measurement of the subjects in the study, which was conducted through personal interviews. There is no control group and no pre-post comparison in this research design.

Study Area

Selection of the study area was based on the researcher's familiarity with his home state of Kedah. Furthermore, Kedah is predominantly Malay. Kedah sits in the Northwest corner of Peninsular Malaysia (see figure 2) and has good access roads to all major town centers across the state, which was one of the logistic considerations for this study. The field assistants employed for this study were familiar with all the eleven districts in the state. The state is an area of 10,000 sq. km that consists mostly of expansive padi (rice) fields and gently rolling hills. The population of Kedah is about 1.4 million, primarily consisting of Malay people, though there are significant numbers of Chinese and Indian minorities. There are 11 districts in the state of Kedah, which include Baling, Bandar Baharu, Kota Setar, Kuala Muda, Kubang Pasu, Kulim, Padang Terap, Pendang, Sik, Yan, and Langkawi (see figure 3).

Sampling Design

The target population for this study included all local Malay people in the State of Kedah who were at least 21 years of age. A minimum of 500,000 Malay people was included for the target population of this study (UN, 2000). The final total number of completed surveys was 550. The individual was the unit of analysis, and the element from which information was collected.

Samples were selected from ten of the eleven districts. The Island District, Langkawi, was not included in this study because the islanders were culturally isolated from the mainland. Besides cultural reasons, logistically it would have been very difficult to conduct interviews on the island because Langkawi Island is a tourist destination.

There tend to be more outsiders (tourist form the mainland) on the island than locals are at any given time.

The sampling was conducted in two phases. The first phase involved the selection of a pool of potential respondents and in the second phase a final respondents list was created by randomly drawing 550 names from the pool.

Phase 1

The selection of the samples for the interviews was conducted in each district's major town center. This was done with the assumption that all the residents within each district visited the major town centers at least once during the span of a week to do their routine activities, which might include shopping, selling farm produce, traveling to other towns, getting medical care or visiting with friends at coffee stalls. The towns were Baling, for the district of Baling, Serdang, for the district of Bandar Baharu, Alor Setar, for the district of Kota Setar, Sungai Petani, for the district of Kula Muda, Jitra, for the district of Kubang Pasu, Kulim, for the district of Kulim, Kuala Nerang, for the district of Padang Terap, Pendang, for the district of Pendang, Sik, for the district of Sik and Yan, for the district of Yan. Most people live within ten to twenty minutes driving distance from these town centers.

A multistage, systematic random sampling (Babbie, 1995; Cochran, 1977) approach was employed in this research. In this phase of sampling a pool of potential respondents were chosen from all ten towns using the systematic random sampling technique. The selections of the potential respondents were conducted over the span of one week. Each day was divided into three time periods, the first period started at 7am, the second started at 12 noon, and the third period began at 8pm. The sampling periods ended when ten potential respondents were identified for each period.

Field assistants were stationed at strategic locations in their town centers. The locations were close to bus terminals, fish markets or grocery stores. The strategy was to select places that most of the people tend to congregate. The field assistants contacted every fifth Malay person that they encountered. Upon contact, the field assistants completed a 'potential respondent pool' card. The field assistants asked five basic questions including (1) Are you at least 21 years old? If the answer was yes, they then proceed by explaining the research briefly and asked the next question: (2) Have you been contacted by other field assistants regarding this study before this? If the answer was a no, they proceeded to the next question: (3) Are you willing to participate in this study if you are selected?: (4) If they were willing to participate, they asked for and recorded the respondents' addresses: and, (5) The field assistants asked for and recorded the day and the range or block of time that best suited the potential respondents for the actual interviews, which were conducted the following week.

The total number of potential respondents obtained for the pool during the first phase of sampling was 2,100 people (i.e.,10 towns x 7 days x 3 sampling periods x 10 people = 2,100).

Phase 2

In this phase, all the cards were placed in a box grouped by towns. Single digit random number (1 to 9) was used to draw each respondent. The random numbers were drawn from a table of random numbers to pick 550 cards. The selection began with the first card being drawn based on the random number and proceeded until the 2,100th card, and back again to the 1st card until all 550 cards were selected. For example, if the first random number was 3, then the third card was drawn and a marker was placed at that spot in the pool. Then, the next card was drawn that corresponded to the next random number, counting forward from the previous marker and marking the spot that was vacated by the latest pick. This procedure was followed until all 550 cards were selected. Grouping the cards within their original districts ensured that people from all the districts had an equal chance to be selected.

Data Collection

Pre-field activities

Planning the interview routes and times was critical during this stage of data collection. The field assistants, one for each of the districts that was sampled had to familiarize themselves with their respective area. Assistants referred to local street maps as we selected the routes and times to conduct the interviews. Since there were 55 potential respondents for each district, we decided that the field assistants had to complete 8 to 10 interviews per day and the group had one week to complete these. The field assistants were given a day to ride their motorcycles or cars along the interview routes, to make sure that they were familiar with their respective districts and to find their way around easily. The next day the researcher met with all the field assistants to discuss any problems or potential problems that the field assistants might face during the actual data collection.

Selection of field assistants and training.

Ten students from local colleges were hired as field assistants for the research. The field assistants were familiar with the state of Kedah because most of them were from Kedah. A training session for data collection processes was conducted for the field assistants. During the training sessions, the researcher described the purpose of the study, various stages of the random sampling procedures, characteristics of each variable in the survey instrument, and each variable's corresponding attributes. The field assistants were also briefed about the sequence of the questions, introductory techniques and techniques to avoid disruptive situations during actual interviews. Each field assistant was given time to practice the interviewing process and later, they each conducted a live interview session with the researcher as a final test. The researcher then entertained questions and resolved the problems that surfaced during the practice sessions.

Pre-testing the interview schedule.

Pre-testing of the interview schedule was carried out by the researcher in his hometown of Alor Setar, which is in the district of Kota Setar, during the first week of August 2000. Pre-testing of the interview schedule was necessary to ensure minimal measurement error and to ensure the face and content validity of the instrument. The researcher made sure that the interview questions were clearly written and that there were no confusing responses from the respondents. The researcher also made sure that the instrument had face, criterion, and content validity.

During pre-testing, the researcher interviewed and spoke to 25 respondents and received constructive feed back regarding interview instructions, feasibility of the attribute choices, clarity of the interview questions, its coherence, and the interview process in general. The survey instrument was then revised for the actual data collection.

Actual data collection

The actual interviews began on 20th of August, 2000 and ended on 26th August 2000. The data collection period took a total of 25 days to complete. This included training of field assistants, pre-field activities, sampling, and the actual interviews. The data collection progressed smoothly during the entire week. The field assistants went to their respective districts and started the interview process based on the addresses collected earlier during the sampling stage. Each field assistant attained their quota of 55 potential respondents plus five other names in a reserve list in case of refusals at their respective areas.

The assistants contacted their potential respondents the next day if they failed to make initial contact as pre-planned. After trying for the second time, the field assistants were permitted to contact the potential respondent in their reserve list. The researcher randomly monitored the interviews by visiting each district after contacting the field assistants via wireless phones. It took about 20 to 30 minutes to complete each interview.

Research instrument

The research instrument was developed based on the proposed measurement model of "Adopter Characteristics" as shown in figure 7. The interview instrument consists of five groups of questions. The groups mirrored the proposed measurement model and the responses were used to fulfill the study objectives. The first group of questions, which consists of a single item, was used to determine the adopter groups. The second group of questions, which contained 16 items, was used in the construction of personality scales that were then used to discriminate the adopter groups. The next three groups of questions, which consist of items regarding importance of natural resources (10 items), value of natural areas (12 items), and importance of natural resources to quality of life (12 items), were used as test variables to compare differences between adopter groups. The final group of questions was basic demographic items that were used in both as group discriminators and as test variables for group comparisons.

The nature of each group, the individual questions under each group, and their attributes are presented below.

<u>Question 1 (a)</u> attempts to determine if respondents were aware of current pollution problems in the local rivers. The responses were coded as nominal, either as "yes" or "no."

<u>Question 1 (b)</u> is a practical hypothetical scenario presented to the respondent. "*The public, which includes you and I, is said to be one of the major contributors to this problem. We have been discarding all kinds of waste materials into our drain system. Now, let's assume that the government has come up with a new waste disposal strategy, which if adopted by the public could alleviate some of the river pollution problems in the future. This new strategy is just a recommendation by the government and is not required by the law. Therefore, it's up to you if you want to practice this new domestic waste disposal strategy or not. There is* ***no right*** *or* ***wrong answer*** *for this question. So, please answer based on how you feel about making changes to your existing practice of waste disposal voluntarily, taking into account that this change might cost you bit more, but at the same time it helps keep the rivers cleaner.*"

The respondents were required to choose one of the four statements that best described how they would react to the hypothetical request as stated above. Each of the four responses corresponded to an adopter category but the respondents were not aware of it: (A) *Innovators* - I will probably be the first one to try this new method, since it helps clean our rivers: (B) *Early adopters* - I will probably try out this new method after I study the details and be a role model to provide information to others: (C) *Majority* - I will try out this new method if most of the people around me have already adopted this new method: (D) *Laggards* - I will most likely not change the way I dispose off my domestic waste now, unless, it's required by the law.

The design of the four responses was based on the adopter categories' key characteristics as described by Rogers (1995). This variable was used to determine self reported group membership, which served as the dependent variable for the discriminant function analysis of the data in this study.

Question 2: "In your opinion, do you think that the Malaysian Government has taken appropriate actions to help protect and conserve the natural environment? The responses for this variable were coded as either as a yes, no or not sure. This question was designed to also determine if the respondents were aware of any appropriate government interventions in the protection and conservation of the natural environment.

Question 3: "In your opinion, do you think that the Malaysian mass media such as TV, Radio, and Newspapers have played effective roles towards the protection and conservation of the natural environment? The responses for this variable were coded as either a yes, no, or not sure.

Question 4: This question was designed to assess the attitude of the respondents towards specific environmental problems and their possible solutions. The responses for all sixteen variables were coded on a five- point scale ranging from 1 "strongly disagree with the statement" to 5 "strongly agree with the statement" and 3 "neutral, neither agree nor disagree with the statement". All sixteen variables were used in the construction of four concepts.

The personality concept of rationality was composed of three variables: Recycling my cans, glass, and paper will help the solid waste problems; If I reduce the amount of solid waste I produce, it will make a difference in the solid waste problem; and I can influence the forces that cause pollution.

The personality concept of dogmatism was composed of four variables: Whether I live an environmentally sound lifestyle, or not, has no impact on whether or not others do; My voice can influence government to help solve many environmental problems; The amount of solid waste I produce is so small compared to the total that it does not matter; and Recycling my cans, glass, and paper is significant in the total environmental picture.

The personality concept of fatalism was composed of four variables: Sometimes I cannot control how much my actions contribute to environmental problems; As one of over 4 billion humans on the planet, my lifestyle has no real effect on the environment; Many problems, such as air pollution, require too much money to solve for me to have any impact; and Many environmental problems require too much power to solve for me to have any impact.

The personality concept of favorable attitude toward science was composed of four variables: By understanding the forces that cause pollution, I can help solve the problems; If I know that some behavior is wasteful, I can usually control it; Since there is really no such thing as luck, most environmental problems will be solved by the efforts of concerned people; and By understanding the forces that cause pollution, I can help solve the problems.

The personality concept of coping with uncertainty is composed of a single variable: Many environmental problems have too many unpredictable elements for effective solutions to be found.

Question 5 was designed to determine the importance of natural resources to the respondents, based on how the ten conditions of various natural resource elements can affect the respondents' lifestyle, health, and so on. The responses were coded on a five point scale: (1) "the condition is not important to me," (2) "the condition is somewhat important to me," (3) "condition is moderately important to me," (4) "the condition is important to me," and (5) "the condition is very important to me." The ten natural resource conditions were: (1) The destruction of Malaysia's tropical rain forest, (2) Acid rain caused by burning fossil fuels, (3) The pollution of streams and rivers, (4) The loss of prime agricultural lands, (5) The loss of wildlife habitat, (6) The possible extinction of a number of plant species, (7) The possible extinction of a number of animal species, (8) The disposal of large quantities of solid wastes in natural areas, (9) The disposal of toxic wastes in natural areas, and (10) The contamination of groundwater.

Question 6 was designed to find out how the respondents valued the various reasons related to the existence of natural areas. All the responses were coded on a five point scale: (1) "Not Important," (2) "Somewhat Important," (3) "Moderately Important," (4) "Important," and (5) "Very Important." The twelve reasons that were rated by the respondents were: (1) Provide recreation opportunities, (2) Protect wildlife, (3) Protect water quality, (4) Protect air quality, (5) Provide opportunities for quality family experience, (6) Conserve natural areas for scientific research works, (7) An important resource for future generations, (8) Provide income from tourism industry, (9) Preserve natural ecosystems, (10) Provide income from logging and mining, (11) Provide opportunities for us to enjoy the esthetics, and (12) just knowing that it's there if I wanted to enjoy it in the future (i.e., existence value).

Question 7 was designed to determine the degree of importance that respondents placed on each of the twelve statements related to their quality of life principles. The responses were coded on a five point scale: (1) "Not important," (2) "Somewhat important," (3) "Moderately important," (4) "Important," and (5) "Very Important." The statements that the respondents rated included (1) Air quality, (2) Time to spend with family, (3) Clean rivers, (4) Education for children, (5) Transportation needs, (6) Religion, (7) Natural environment, (8) Money, (9) Recycling practices, (10) Modern home appliances, (11) Wildlife, and (12) Wealth / being wealthy.

Question 8 was designed to determine the respondents' choice for the one most important quality of life element from the list of twelve elements in question 7. The responses were coded as unique numerical values that represented each of the twelve items.

Question 9 asked the age of the respondents, and the responses were coded as actual numerical values corresponding to their ages.

Question 10 asked the gender of the respondents, and the responses were coded as either male or female.

Question 11 designed to determine the highest level of education that the respondents had attained. The responses were coded as either "none, for no education at all," "primary education," "secondary education (SRP[11])," "secondary education (SPM[12])," "secondary education (STPM[13])," "Diploma[14]," "Bachelors Degree," or "Graduate Degree."

Question 12 attempted to determine the place that the respondents lived when they were growing up. The responses were coded as either "rural village," "small town (Pekan[15])," "large town (Bandar[16])," or "city."

Question 13 inquired about the monthly income of the respondents. All the responses were coded as either less than RM[17] 500.00,
RM 501.00 – RM 1,000.00, RM 1,001.00 – RM 2,000.00, RM 2.001.00 – RM 3,000.00, or greater than RM 3,000.00.

Data Analyses

This section is divided into three parts to facilitate an orderly understanding of the progression of all the analyses conducted for the study. The first part lists the different strategies of analysis that were used in this study. Part 2 explains the analysis strategies that were used to achieve each of the three study objectives described earlier in chapter I.

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[11] SRP stands for Lower Certificate of Education. Students who wish to proceed to two more years of education must pass the examination.
[12] SPM stands for Malaysian Certificate of Education, which is equivalent to the "O" levels. Students who wish to proceed to two more years of school ("A" levels) must pass this examination.
[13] STPM stands for Higher School Certificate, which is equivalent to the "A" levels. Students who wish to enter into local colleges to pursue their undergraduate degrees must do well in this examination.
[14] Diploma is equivalent to Associates degree offered to students who graduate from two or three years programs from local colleges.
[15] "Pekan" is the Malay word for small towns that cater to rural areas or villages, which normally consists a few rows of shops selling groceries, food stalls, fresh produce stalls and a small police department.
[16] "Bandar" is the Malay word for towns. Most of these towns will include government offices, besides the regular business, supermarkets, shopping centers and medical facilities.
[17] "RM" stands for Ringgit Malaysia, which is the legal currency tender for Malaysia. US 1.00 is approximately RM 3. 78.

In the final part of this section, the researcher elaborates detailed information regarding the use of "Coefficient Alpha or α" and "Discriminant function analysis," which were the two major multivariate analyses used in this study.

Analysis strategies

The data set was analyzed by utilizing the Statistical Package for the Social Sciences (SPSS) for windows, version 10.01, standard version (SPSS, 1999). The data analyses for this study included various descriptive statistics, reliability analysis, cross tabulations, analysis of variance (ANOVA), and discriminant function analysis. Descriptive statistics were computed to describe the characteristics of the variables in the measurement model, and to describe the socio-demographic characteristics of the respondents. The reliability analyses were conducted to assess the internal consistency reliability for the constructed scales using the "*Cronbach's Reliability Coefficient Alpha or α*." Cross-tabulation was used to test for significance and map the associations between nominal level variables. Analyses of variance *(ANOVA)* with the Scheffe post hoc tests were used to compare the means of various continuous dependent variables for the adopter groups. *Discriminant function analysis* was used to predict and classify adopter groups across various discriminator variables.

Achievement of Objectives:

<u>Development of a descriptive profile for the four adopter groups</u>.

The analyses used to achieve this objective was the computation of descriptive statistics such as frequencies, means, standard deviations, and relative percentages of the four "self reported" adopter groups. Cross-tabulation analyses were conducted to explain the relationships and statistical significance between the adopter groups and various nominal level demographic, knowledge, and awareness variables.

Discrimination of the four adopter groups across predictor variables that best explain the group differences, and validation of the self-reported adopter group memberships

This objective was achieved by, first, testing the internal consistency reliability for the four, scaled indices used to discriminate the adopter groups. The scales were personality variables, which included the concepts of "dogmatism," "fatalism," "rationality," and "favorable attitude towards science."

Discriminant function analysis was employed to analyze the effects of independent variables on group discrimination (see Kleca, 1980) for a detailed explanation of this procedure). Besides the four personality indices, other continuous independent variables like income, education level, and the concept of coping with uncertainty (single item indicator) were used for this analysis.

The subroutine for predicting group membership in discriminant analysis is designed to maximize the number of correct classifications (comparing the self-reported to the computer generated group membership), based on independent discriminator variables.

Cross-validation in SPSS discriminant analysis was performed by dividing the sample into two sub samples. The first sub sample was used to derive the discriminant function and the second was used in validating the functions. The next step was to conduct another discriminant analysis with function and validation groups switched. This validation procedure was important because discriminant analysis is by nature a maximization procedure, selecting the first and each succeeding function to maximize the substantial variance between groups. Since the functions are so well tailored to fit the idiosyncrasies of the sample, the generalizability powers of the functions to other samples might be weak unless cross-validation results proof otherwise.

Another validation analysis that was conducted was the comparison of the percentage correctly classified to the maximum-chance criterion and the proportional-chance criterion (Hair, Andeerson, & Tatham, 1987). The maximum-chance criterion is the percentage correctly classified if all cases were allocated to the group with the greatest probability of occurrence. The proportional-chance criterion was calculated by squaring the proportions of each group.

<u>Comparison of the four adopter groups across various dependent variables related to environmental issues on values, importance of natural resources and quality of life principles.</u>

Before comparisons were made, the researcher tested for the internal consistency reliability by computing coefficient Alpha, for various scaled indices that were constructed. The scaled indices included value of natural resources for conservation, the value of enjoyment of natural resources, destruction of natural habitat, pollution, income from tourism and logging, and extinction of wildlife. One-way ANOVA's and the Scheffe post hoc tests were used to compare the mean differences and statistical significance of the groups on various scales and single item indicators.

Primary Multivariate Strategies

<u>Cronbach's Reliability Coefficient Alpha</u>

Internal consistency describes estimates of reliability of indices based on the average correlation among items within a test and the coefficient alpha reflects both the number of items and their average correlation, which may be thought of as the internal consistency (Nunnally & Bernstein, 1994). The coefficient alpha usually provides a good estimate of reliability because sampling of content is the major source of measurement error for constructs and also because it is sensitive to the sampling of concepts as well as item content.

Cronbach's alpha is based on the average correlation of items within a group of survey questions or variables, if the items are standardized to a standard deviation of 1; or on the average covariance among items on a scale and if the items are not standardized. All the items in a scaled index are assumed to be positively correlated with each other because they are measuring the same theoretical concept.

The coefficient alpha can be viewed as the correlation between a scaled index and all other possible scaled indices containing the same number of items that measure the characteristics of interest. Coefficient alpha can also be interpreted as the squared correlation between the score a person obtains on a particular scale and the score the individual would have obtained if questioned on all possible items in the universe.

Alpha ranges from 0 to 1. A negative alpha value can occur when items are not positively correlated among themselves and the reliability model is violated. Coefficient alpha sets an upper limit for reliability of tests constructed in terms of the domain-sampling model based upon observed correlations. If the alpha is very low, the test is either too short or items have very little in common. If the alpha is high, the items grouped together may indicate a common underlying concept.

Although a satisfactory level of reliability depends on how a measure is being used, as well as the type of research being conducted, Nunnally and Bernstein (1994) suggested that in the early stages of construct development, indices with even modest reliability (e.g., 0.65) are acceptable. In true experimental research dealing with each individual (e.g. testing IQ in children), a reliability of 0.80 may not be high enough to make decisions about an individual. A researcher may need a coefficient of 0.90 or higher. An example of a true experiment, group research, which is often concerned with the size of the correlation and with mean differences among experimental treatments, a reliability of 0.80 is adequate (Nunnally & Bernstein, 1994). Social science researchers often accept a reliability coefficient below 0.80 in their measurements (Carmines & Zeller, 1982)

Discriminant Function Analysis

Discriminant function analysis is a technique that allows the researcher to examine and describe simultaneously the differences between two or more mutually exclusive groups with respect to several continuous variables. In other words, this is a technique for identifying the relationships between a categorical dependent variable and interval level predictor variables.

Discriminant analysis was introduced into psychology through applied testing programs for personnel selection and placement. According to Nunnally and Bernstein (1994) and Brown and Tinsley (1983), discriminant analysis is both a conceptual and mathematically powerful tool, which has not been used nearly as much in the behavioral sciences. Hake (e.g., Hake, Faust, McIntyre, & Murray, 1967; Rodwan & Hake, 1964) pioneered discriminant analysis applications in experimental psychology. Early applications of discriminant analysis used ability tests rather than noncognitive traits, interests, and values (Nunnally & Bernstein, 1994)

The key variable in discriminant analysis is the group variable, which is the dependent or criterion variable. Obtaining a random sample of subjects in the various groups is vital but often difficult (Nunnally & Bernstein, 1994). As defined by Nunnally and Bernstein (1994), discriminant analysis is used to distinguish predefined groups from one another based on their score profiles on certain variables.

Numerous trial-and-error methods have been proposed to cluster people on the basis of their response patterns (Lorr, 1983; Tryon & Bailey, 1970) In this study, *the respondents were classified into one of four groups based on how they answered question 1B of the survey instrument (see appendix A). The four groups are based on adopter categories* (Rogers, 1995), *for the respondents who answered: A, "I will probably be the first one to try this new method, since it helps clean our rivers," they will be classified as the "innovators"; B, "I will probably try out this new method after I study the details and be a role model to provide information to others," they were classified as the "early adopters" ; C, "I will try out this new method if most of the people around me have already adopted this new method," they were classified as the "majority" ; and D, "I will most likely not change the way I dispose off my domestic waste now, unless, it's required by the law," they were classified as the "laggards."*

Discriminant analysis is designed to answer the following questions: (1) What dimension (i.e., characteristics) are most important in representing the multivariate group differences? (2) How might the dimensions be interpreted or described? (3) What are the contributions of the variables to these underlying dimensions? 4) How can the groups be spatially represented to make the groups differences available to the direct observation of the investigator? and 5) How can new (e.g., unclassified) persons or elements be assigned to the group to which they are most similar (Borgen & Seling, 1978; Huberty, 1975; Tatsuoka & Tiedeman, 1954).

Placement concerns the assignment of new individuals to a group when their membership is unknown. This is done by comparing the target person's profile with the average profile for people known to belong to the various groups. Placements may use either the observed or the discriminant scores for the assignment of new individuals into groups (Bernstein, 1988; Cooley & Lohnes, 1971). For the purpose of this study, discriminant scores were used. Discriminant scores or coefficients are usually correlated within a particular group even though they are uncorrelated across groups.

A discriminator variable is a measure of some characteristics on which the groups of individuals under study are expected to differ. In one-dimensional analysis such as t-test or ANOVA, these independent measures are known as predictor variables. The effective use of discriminant analysis depends on the relevance of the discriminant variables to group differences. Maximum discriminative efficiency is achieved when the discriminant variables have been determined based on past research or theory to be relevant to group discrimination and each variable represents a unique characteristic on which groups are expected to differ (Brown & Tinsley, 1983).

According to Brown (1983), sample size is an important data requirement but he feels that the literature on discriminant analysis contains conflicting recommendations on this topic. Small sample sizes should be avoided because they tend to introduce bias when calculating the proportion of cases (e.g., persons) correctly classified using discriminant analysis (Huberty, 1975; Morrison, 1974). Large sample sizes, on the other hand, tend to result in an over estimate of the statistical significance of the discrimination attributed to the functions (Huberty, 1975; Tatsuoka, 1970)

For samples of 400 or more subjects however, the item parameters tend to be relatively stable so the addition of subjects become less crucial (Tinsley & Kass, 1979). Besides the total sample size, the minimum or maximum number of cases per group must be considered. Tatsuoka (1970) had suggested that the size of the smallest group to be analyzed should be no less than the number of variables used. Hurberty (1975) recommends three times as many cases in the smallest group as there are discriminant variables with one-third the number of cases in each group being used as a cross-validation sample.

Discriminant analysis will produce a more parsimonious result when large numbers of groups and/or discriminant variables are analyzed because the interrelatedness of the variables is considered. Discriminant analysis will also reduce the likelihood of a type I error (i.e., that differences which occurred by chance will be judged statistically significant) than if one performed multiple t-test or ANOVA to compare differences between groups.

When multiple measures are taken of members belonging to mutually exclusive groups, no single characteristics (measure) of the members will best differentiate the groups (Tatsuoka, 1970). Instead, some combination of information from all of the measures will determine the dimension(s) most helpful in telling groups apart. If groups differ to a small degree on a number of dimensions and these small group differences are added across all dimensions, the groups are maximally discriminated and the group differences are more discernable (Kleca, 1975; Sananthanan, 1975; Tatsuoka, 1970).

Discriminant analysis is designed to weight and linearly combine (add) scores on the discriminator variables in such a manner as to force groups to be as mathematically distinct as possible. To accomplish this, a weight, called a discriminant coefficient, is calculated for each discriminator variable. The magnitude of the discriminant coefficient is dependent on the relationship between group differences and scores on the discriminator variable (Tatsuoka, 1970).

CHAPTER IV

RESULTS

Chapter IV presents the results from data analyses described in the previous chapter. This chapter is divided into five sections. Section one deals with the description of survey response rates and problems faced during sampling and data collection. Section two describes the profiles of the respondents, adopters groups and characteristics of variables measured in the model. Section three presents the results of reliability tests of constructed indices. Section four presents the discriminant function analyses on the adopter groups. Section five deals with the results of adopter groups' comparison on various test variables, which consists of scaled indices and single item indicators.

Survey Response Rate

The response rates were calculated using two different criteria. The first was the response rate for individuals who agreed to participate in the study, which was calculated based on the sample pool and the number of declines from individuals who met the study criteria. The response rate for the sample pool was high, in that only 73 qualified individuals did not want to be included in the sampling pool of 2,200. The response rate for the sampling pool was 96.8 %. Dominant reasons given by individuals for their non-participation included not being familiar with survey research (35 people), not residing in sampled district (12 people), or not being around during the interview period (15 people). Only seven people did not wish to participate in the study.

The second response rate was based on the actual survey interview. Only 2 % (12 cases) of the respondents selected for the interview did not participate in the actual survey. The researcher still was able to obtain 550 interviews because there was a reserve list available for substitution interviewees. Reasons for non-participation included not at home (7 cases), wrong address (3 cases), or people were ill / hospitalized (2 cases).

Characteristics of the Respondents

All Respondents

The average age of the respondents was 33 years, 52 % were male respondents. The majority of the respondents grew up in small and large towns (78.5%). Only 7% grew up in the city and the remaining 14 % grew up in rural villages. Almost one half (46 %) of the respondents had attained high school and lower level of education and the rest (54%) had completed at least some tertiary education. Among the respondents who had at least some tertiary education 65 % of them had attained associate's degree, 33 % had bachelors degree and only 2 % had graduate degree. A majority of the respondents (75 %) earned between RM$1,001.00 and RM$3,000.00 monthly income (US$ 1.00 = RM$ 3.80). Only 14 % of the respondents made RM$1,000 or less per month and 11 % earned greater than RM$3,000.00 per month.

The respondents were informed that there were many issues regarding the pollution of local rivers and were asked if they were aware of this problem. Ninety percent of the respondents were aware of the problem and the others (10 %) were not aware. When asked about their opinion if appropriate actions were taken by the government to help protect and conserve the natural environment, only 17 % of the respondents said yes. The rest of the respondents either said no (40 %) or that they were not sure (43 %). Eighteen percent of the respondents thought that the Malaysian mass media had played effective roles in the protection and conservation of natural environment. The rest of the respondents thought otherwise (39 % said no and 43 % were not sure).

Based on their answers to the adopter classification question respondents were grouped into one of four adopter groups. The innovator group consisted of 71 individuals (12.9 %). The adopter group had 103 members (18.7 %). The largest group was the majority group with 299 members (54.4 %). The laggards' group had 77 individuals (14.%)(see Table 1).

Table 1. Self-reported adopter group membership

	Frequencies	Percentages
INNOVATORS	71	12.9
EARLY ADOPTERS	103	18.7
MAJORITY	299	54.4
LAGGARDS	77	14.0

The respondents were asked to rate the 12 statements in Table 2 in term of the statements' importance to their quality of life principles. Respondents rated the items "education for children"(52 %), "religion" (57 %), and "money" (56 %) as being "very important." Respondents rated the items "time to spend with family" (52 %), "education for children" (48 %), "religion" (41 %), "clean rivers" (35 %), and "money" (42 %) as being "important." Respondents rated the items "natural environment" (73 %), "recycling practices" (72 %), "modern home appliances" (75 %), "wildlife" (83 %), and "wealth" (72 %) as being "somewhat important" to "moderately important."

The respondents felt that of the 12 items in Table 2 "religion" (52 %), "time to spend with family" (33 %), and "money" (10 %) were the most important item to their "quality of life" principles.

Table 2. Percentage response to "Please rate the following statements in terms of their importance related to your "quality of life "principles."

		Percentage of Respondents (n=550)				
Items	Mean[1]	Not Important	Somewhat Important	Moderately Important	Important	Very Important
Education for Children	4.5	0	0	0	48	52
Religion	4.5	0	0	2	41	57
Money	4.5	0	0	2	46	56
Time to spend with family	4.0	0	1	25	52	22
Transportation needs	3.9	1	2	23	57	17
Clean rivers	3.8	1	4	38	35	22
Air quality	3.6	2	7	38	37	16
Natural environment	3.2	1	14	59	21	5
Wealth/being wealthy	2.9	6	18	53	22	1
Recycling practices	2.7	10	31	42	14	3
Modern home appliances	2.7	8	36	39	13	4
Wildlife	2.6	5	46	37	10	2

[1] means were calculated based on responses coded as: 1= not important, 2=somewhat important, 3=moderately important, 4=Important, and 5=very important.

Characteristics of Adopter Groups

The average age for innovators and early adopters was 31 years. The average age for the majority group was 32 years and the average age for the laggards was 41 years. Statistically, there were no significant differences on the mean ages between the innovators and the early adopters, between innovators and majority, and between majority and early adopters at $p<.001$. However, there were statistical significance (F (df = 3 , 546)=42.81, p=.001) for the comparisons between the mean ages of laggards and the other three adopter groups. Therefore, the laggards were on the average older than the innovators, early adopter and the majority groups.

Table 3 presents the results of cross tabulation between adopter groups and level of education attained. The χ^2 test indicates that differences between cell percentages were statistically significant (χ^2 =85.53, df = 3, p = .001). Higher percentage of innovators (78 %), early adopters (67 %), and majority (56 %) had completed some level of tertiary education. Only 9 % of the laggards had attained any tertiary education.

Table 3. Level of education attained by adopter group members

	Percentage of adopter categories						
	Innovators n = 71	Early Adopters n = 103	Majority n = 299	Laggards n = 77	df	χ^2	p
High school or lower	22.5	33.0	44.5	90.9	3	85.53	.001
Tertiary	77.5	67.0	55.5	9.1			

Table 4 indicates that innovators and early adopters earn more money than the other two groups (χ^2 = 433.31, df = 9, p = .001). Seventy percent of the innovators and 46

% of the early adopters earned a monthly income of between RM $ 2,001.00 and RM $ 3,000.00, and 24 % of innovators and 33 % of early adopters earned more than RM $ 3,000 a month. Seventy one percent of the laggards earned only between RM $ 500.00 and RM $ 1,000.00 a month. Most of the individuals in the majority group (64 %) earned between RM $ 1,001.00 and RM $ 2,000.00 a month.

Table 4. Respondents' monthly income category

	Percentage of adopter categories						
Income	Innovators n = 71	Early Adopters n = 103	Majority n = 299	Laggards n = 77	df	χ^2	p
RM500-RM1000	2.8	1.0	6.4	**71.4**	9	433.31	.001
RM1001-RM2000	2.8	20.4	**64.2**	23.4			
RM2001-RM3000	**70.4**	**45.6**	26.8	5.2			
>RM3000	**23.9**	**33.0**	2.7	0.0			

Table 5 indicates that more than 76 % of the individuals in each adopter group grew up in small and large towns. The percentages across each adopter category are mirror images of the overall percentages for respondents response to this question: rural village (15 %), small town (40 %), large town (39 %), and city (7 %). The place where people had lived while they were growing up did not affect their group affiliation (χ^2 =2.35, df=9, p=.985).

Table 5. Percentage of respondents indicating where they lived while growing up

Place	Percentage of adopter categories				df	χ^2	p
	Innovators n = 71	Early Adopters n = 103	Majority n = 299	Laggards n = 77			
Rural Village	16.9	16.5	13.7	13.7	9	2.35	.985
Small Town	36.6	41.7	40.8	37.7			
Large Town	39.4	34.0	38.9	42.9			
City	7.0	7.8	6.7	6.5			

Table 6 indicates a high percentage of the respondents in all four adopter groups said that they were aware of the river pollution issues in Malaysia almost all of the innovators (99 %) and early adopters (99 %) said that they were aware of the problem. The majority (87 %) and laggards (82 %) respectively were aware of the problems (χ^2 =23.68, df = 9, p = .001).

Table 6. Percentage response to "Lately there have been many issues raised regarding the pollution of our rivers. Are you aware of this problem?"

	Percentage of adopter categories				df	χ^2	p
	Innovators n = 71	Early Adopters n = 103	Majority n = 299	Laggards n = 77			
YES	98.6	99.0	87.3	81.8	3	23.68	.001
NO	1.4	1.0	12.7	18.2			

Table 7 indicates that more than 84 % of the innovators and about 68 % of the early adopters said that the Malaysian government had not taken appropriate actions to protect and conserve natural environments (χ^2 = 160.65, df=6, p =.001) . The laggards (68 %) and the majority (57 %) were not sure if appropriate action had been taken by the government. Only about 3 % of the innovators were not sure about the government's actions.

Table 7. Percentage response to "In your opinion, do you think that the Malaysian government has taken the appropriate actions to help protect and conserve the natural environment."

	Percentage of adopter categories						
	Innovators n = 71	Early Adopters n = 103	Majority n = 299	Laggards n = 77	df	χ^2	p
YES	12.7	20.4	19.1	13.0	6	160.65	.001
NO	84.5	68.0	24.1	19.5			
NOT SURE	2.8	11.7	56.9	67.5			

Table 8 indicates whether the Malaysian mass media played effective roles toward the protection and conservation of natural environments, more than 80 % of the innovators and 68 % of the early adopters said no, that the mass media did not take appropriate actions (χ^2 = 149.88, df =6, p =.001). As for the remaining two groups, the laggards (69 %) and the majority (56 %) were not sure about the mass media's effective role in this matter. About 10% to 20 % of individuals from each adopter group said that they thought the media were playing effective roles in the protection and conservation of natural environments.

Table 8. Percentage response to " In your opinion, do you think that the Malaysian mass media such as TV, Radio, and Newspapers have played effective roles toward the protection and conservation of the natural environment?"

Response	Percentage of adopter categories				df	χ^2	p
	Innovators n = 71	Early Adopters n = 103	Majority n = 299	Laggards n = 77			
YES	15.5	20.4	19.4	13.0	6	149.88	.001
NO	80.3	67.0	24.4	18.2			
NOT SURE	4.2	12.6	56.2	68.8			

Reliability Analyses of Constructed Indices

Three sets of indices were constructed for the purpose of adopter group validation and testing. The first set consists of four personality indices, which are the rationality, dogmatic, fatalistic, and favorable attitude towards science scales. The discriminator variables were these four scales, the personality variable "coping with uncertainty," and the socio-economic variables of income and education level.

The next set of indices were three concepts related to the importance of natural resource conditions including destruction to natural resources scale, pollution scale, and extinction of plant and animal scale. The third set of indices consists of four scales related to natural resources value including enjoyment of natural resources value scale, preservation value scale, conservation value scale, and income value scale. Both of these groups of indices together with other single item indicators or variables were used for testing adopter group differences.

Personality Scales

Table 9 reports the Reliability analyses that were performed to assess the internal consistency of the various personality indices. All four indices obtained high reliability coefficients. The rationality scale that was composed of three items had an Alpha Coefficient of .90. The Alpha value could not be improved any further by dropping any of items in the scale; so all three items were used in the scale construction. The inter item correlation ranged from .74 to .79.

The dogmatism scale that was composed of four items had an Alpha Coefficient of .88. The Alpha value could not be improved by dropping off any items; therefore, all four items were kept for the scale construction. Their inter item correlations ranged from .58 to .72.

The fatalism scale, which was composed of four items, had an Alpha Coefficient of .91and all the original items were used in the scale construction since the Alpha value could not be further improved by omitting any of the items. The inter item correlation for the items in the scale ranged from .70 to .77.

The favorable attitude towards science scale was composed of four items and had an Alpha Coefficient of .93. All the items were kept for the construction of the scale since the Alpha value could not be improved by omitting any of the items. The inter item correlation for the items in the scale ranged from .72 to .78.

Table 9. Reliability analyses for items in four personality scales based on the response to "This questionnaire is designed to assess some of your general feelings about the environmental problems and possible solutions to those problems. Please indicate the amount of agreement that you might have with each statement.

Item[1]	Corrected item Total Correlation	Alpha if Item Deleted
Rationality		
Cronbach's Alpha = .90		
Recycling my cans, glass, and paper will help the solid waste problem.	.79	.88
If I reduce the amount of solid waste I produce, it will make a difference in the solid waste problem.	.82	.84
I can influence the forces that cause pollution.	.82	.85
Dogmatic		
Cronbach's Alpha = .88		
Whether I live an environmentally sound lifestyle or not has no impact on whether or not others do.	.75	.84
My voice can influence government to help solve many environmental problems[2].	.74	.84
The amount of solid waste I produce is so small compared to the total that it does not matter.	.76	.83
Recycling my cans, glass, and paper is significant in the total picture[2].	.71	.86
Fatalism		
Cronbach's Alpha = .91		
Sometimes I cannot control how much my actions contribute to environmental problems.	.79	.89
As over 4 billion humans on the planet, my lifestyle has no real effect on the environment.	.77	.89
Many problems, such as air pollution, require too much money to solve for me to have any impact.	.82	.88
Many environmental problems require too much power to solve for me to have any impact.	.81	.88
Favorable Attitude Towards Science		
Cronbach's Alpha = .93		
By understanding the forces that cause pollution, I can help solve the problems.	.80	.91
If I know that some behavior is wasteful, I can usually control it.	.80	.92
Since there is really no such thing as luck, most environmental problems will be solved by the efforts of concerned people.	.86	.89
By understanding the forces that cause pollution, I can help solve the problems.	.85	.90

[1] Response to items were coded as 1= strongly disagree ; 2=disagree ; 3= neutral ; 4=agree ; and 5= strongly agree .

[2] Responses to these items were reverse coded.

Importance of Natural Resources Scales

Table 10 reports the reliability analyses for the importance of natural resources scales. The scales under this group resulted low Alpha coefficient values. The destruction of natural resource scale and extinction of plant and animal scale were both composed of two items and their Alpha Coefficients were .48 and .78 respectively. The inter item correlations for the items in scales were .32 and .64 respectively.

The pollution scale was the third scale in this group and it was composed of five items. The Alpha Coefficient was .62 and the inter item correlations for the items in the scale ranged between .41 and .78.

Table10. Reliability analyses for items in three concepts related to the importance of natural resources conditions based on the response to "This questionnaire is designed to determine how important natural resources are to you. The conditions of our natural resources can sometimes affect your lifestyle, health, and so on. Keeping this in mind, please rate the following natural resources conditions in terms of their importance to you."

Item[1]	Corrected item Total Correlation	Alpha if Item Deleted
Destruction of Natural Resources		
Cronbach's Alpha = .48		
The destruction of Malaysia's tropical rain forest	.32	-
The loss of wildlife habitat	.32	-
Pollution		
Cronbach's Alpha = .62		
Acid rain caused by burning fossil fuel.	.23	.66
The pollution of streams and rivers.	.06	.72
The disposal of large quantities of solid waste in natural areas.	.64	.44
The disposal of toxic waste in natural areas.	.64	.44
The contamination of groundwater.	.46	.56
Extinction of plants and animals		
Cronbach's Alpha = .78		
The possible extinction of a number of pant species.	.64	-
The possible extinction of a number of animal species.	.64	-

[1] Response to items were coded as 1= not important ; 2=somewhat important ; 3= moderately important ; 4=important ; and 5= very important .

Natural Resources Value Scales

Table 11 reports reliability analyses result for the natural resources values scales. The enjoyment of natural resource scale was composed of five items and had an Alpha Coefficient value of .89. The scale could have been improved to .92 by dropping the item "provide recreation opportunity" but the researcher decided to keep the item in the scale

Table 11. Reliability analysis for items in four different natural resources value scales based on the response to "Many reasons have been proposed for valuing natural areas. Please tell me how important each of the following reasons is to you with regards to natural areas around you."

Item[1]	Corrected item Total Correlation	Alpha if Item Deleted
Enjoyment of Natural Resources Value		
Cronbach's Alpha = .89		
Provide recreation opportunities	.48	.92
Provide opportunity for quality family experience.	.80	.86
An important resource for future generations to enjoy.	.88	.84
Provide opportunities for us to enjoy the aesthetics.	.78	.86
Just knowing that it's there if I wanted to enjoy it in he future.	.77	.86
Preservation Value		
Cronbach's Alpha = .64		
Protect wildlife habitat.	.34	.69
Preserve natural ecosystem.	.55	.41
Preserve natural areas for scientific works.	.51	.47
Conservation Value		
Cronbach's Alpha = .51		
Protect water quality.	.34	-
Protect air quality.	.34	-
Income Value		
Cronbach's Alpha = .60		
Provide income for tourism industry.	.43	-
Provide income from logging and mining.	.43	-

[1] Response to items were coded as 1= not important; 2=somewhat important; 3= moderately important; 4=important; and 5= very important.

because this item was measuring a different sector of the construct, which was needed for the parsimony of the scale. The inter item correlation for the scale items ranged from .40 to .84.

The conservation value scale and income value scale both composed of two items each and had Alpha Coefficients of .51 and .60, respectively. The inter item correlations for the scale items were .34 and .43, respectively.

The final scale in this group was the preservation value scale, which was composed of three items and had an Alpha Coefficient of .64. Although the researcher could have dropped the item "protect wildlife habitat" to increase the alpha value to .69, it was decided that all three items were included in the scale to maintain parsimony of the preservation value scale. The inter item correlations for the items in the scale ranged from .33 to .53.

Discriminant Function Analyses

Discriminant analysis was used to explore the discriminating strength of discriminator variables in differentiating the four adopter categories. The discriminator variables used in the analysis were dogmatism scale, fatalism scale, rationality scale, favorable attitude towards science scale, coping with uncertainty, income, and level of education.

Table 12 reports three discriminant functions that predicted the group differences. All three functions were statistically significant at $p < .001$ and their Chi-Square values were 1269.53 (df=21) for the first function , 387.49 (df=12) for the second function, and 68.51 (df=5) for the third function.

Eighty one percent of the variance in the discriminator variables was accounted for by the first function relative to the other two functions (relative percent[18]). Functions two and three explained 16 % and 2.7 % of the variance, respectively. These values provide an indication of the relative importance of each function for discriminating among the adopter groups.

Although the numbers on the relative percent looks promising, the absolute amount of variance in the discriminator variables that were accounted for by the functions is important. All three functions together accounted for 71 % of the absolute variance in the discriminator variables. The absolute percent (variance) was calculated by dividing the sum of the eigenvalues by the number of predictor variables used in the analysis (e.g. 5/7 = .714). Breaking it down by the functions revealed that the first function accounted for 58 % percent of absolute variance[19] in the group differences, followed by function two (11 %) and function three 2 %. Since these functions are orthogonal, the absolute percentages of each function should add up to 71%.

The canonical correlation (see table 12) indicates the relationship between the variance accounted for by one function and the adopter group differences. The squared canonical correlations indicate the proportion of variance in a function. Therefore, 81 % of the variance in function one is associated with adopter group differences as compared to 45 % for function two and 12 % for function three. Canonical correlations provide another way of evaluating the functions; therefore, functions associated with the larger canonical correlation, in this case functions one and two, are the most important.

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[18] The relative percent is calculated by dividing each eigenvalue by the sum of the eigenvalues.
[19] Absolute variance accounted by each function can be calculated by multiplying the relative percent by the overall absolute percent.

The Wilks' Lambda statistic in Table 12 is an inverse measure of the discriminating information in the seven discriminator variables. The use of both the Wilks' Lambda and Chi-square statistics to determine the importance of the functions has been highly recommended by a few statisticians like Hurberty (1975), Tatsuoka (1970) and Sanathanan (1975). The larger the Lambda value, the less information remains in the discriminator variables which is systematically related to group differences. The Wilks' Lambda for function one is .9, which has the most discriminator information, as compared to .88 for function three, which has the least discriminator information to contribute in group differentiation. The Chi-square values accompanying the Wilks' lambda statistics in Table 12 indicated that all remaining information down the column for the functions were statistically significant at $p < .001$.

Table 12. Evaluations of the Discriminant Functions that predicted adopter groups

Function	Eigenvalue	Relative Percent[1]	Canonical Correlation[2]	Wilks' Lambda[3]	χ^2	df	p-value
1	4.07	81.3	.90	.09	1269.53	21	.001
2	.80	16.0	.67	.49	387.49	12	.001
3	.13	2.7	.34	.88	68.51	5	.001

[1] The proportion of variance in a function, which is related to variance in the discriminators, it's the relative percentage of the Eigenvalue.
[2] Indicates the proportion of variance in a function which is related to differences among groups.
[3] Is an inverse measure of the discriminating information available in the discriminator variables; the larger the Wilks' Lambda value, the less information there is remaining in the discriminator variables.

Interpretation of the functions

There are two possible methods for the interpretation of the discriminant functions. Examining the standardized canonical coefficients of the functions is one method and the other is examining the discriminant function-variable correlations. The standardized canonical coefficients were obtained by multiplying the raw coefficient for each predictor variable by the standard deviation for that variable. The discriminant function-variable correlations are the correlations between each function and each of the discriminator variables. The researcher used both methods and only the largest coefficients or correlations were used to describe the functions. It should be noted that the two methods might yield very different results, but at the same time, by looking at both methods, redundancies of the contributing discriminator variables can be detected.

A number of researchers advocate the use of discriminant function-variable correlations because there is greater stability of the correlations in small to medium sized sample and that the correlations give a direct indication of which variables are most closely aligned to the discriminant function (Darlington, Weinberg, & Walberg, 1973; Meredith, 1966; Porebski, 1966). On the other hand, the standardized canonical coefficients are partial coefficients (Stevens, 1995) where the effects of the other variables are omitted.

Table 13 presents both the standardized canonical discriminant function coefficients and the discriminant function-variable correlations obtained in the analysis. These are the correlations for the best linear function of the discriminator variables differentiating the adopter groups. The correlations showed a marked division between the first function and the other two functions. Based on the interpretation of the correlations, the first function relies heavily on the five personality variables. The second function relies on mainly the socioeconomic variable, education level and the third function uses another socioeconomic variable, which is income, to define itself. Although all three functions are statistically significant at $p < .001$, only the first function accounted for 81 % of the total variability. The second and third functions accounted for 16 % and 2.7 % of the total variability respectively. Examining the absolute variance, the first function accounted for 58 % of the variance in the discriminator variables that predicted adopter group, followed by the second (11 %) and the third functions (2 %). The second and third functions have less practical importance.

The personality discriminator variables of dogmatism and fatalism explained most of the variance in the first function with standardized canonical coefficients (.339 and .439, respectively). Their corresponding discriminant function-variable correlations were .82 and .83, which validates their strong influence on function one. The significant value of the standardized canonical coefficients for the personality variables, coupled with high correlations, as indicated previously for dogmatism and fatalism scales confirm that the two variables were not redundant.

The high correlations in three remaining personality variables in function one suggest that they play some part in the prediction of the groups . Although they have high correlations on function one, their standardized coefficients are very small: rationality variable (correlation = .68, coefficient = .14), attitude favoring science (correlation = .70, coefficient =.18), and coping with uncertainty (correlation = .56, coefficient = .16). The other variables in function one, education level and income, had insignificant correlation values (.28 and .42, respectively) and their coefficients were small (.10 and .16, respectively) making them redundant. The combination of information from the standardized canonical coefficients and the discriminant function-variable correlations revealed that the first function was characterized as a personality function.

Table 13. Discriminant Function Analysis to Predict Adopter Groups

	Standardized Canonical Discriminant Function Coefficients			Discriminant Function-Variable Correlations[1]		
	Functions			Functions		
Discriminator Variables	1	2	3	1	2	3
Education Level	.095	.115	-.897	-.279	**.319** *	-.154
Income	-.164	.210	1.254	-.421	.311	**.578** *
Coping with Uncertainty	.162	.240	.059	**.555** *	.196	.110
Rationality	-.144	.613	.219	**.681** *	.575	-.108
Dogmatism	**.339**	.010	-.050	**.820** *	-.037	.011
Fatalism	**.439**	.777	.076	**.834** *	.402	.049
Attitude Favoring Science	-.179	.362	-.532	**.696** *	.514	-.283

[1] Pooled within group correlations between discriminating variables and standardized canonical discriminant functions.
* Significant at p< .05

The centroids for the adopter group are shown in Table 14. Since the first two functions explain the greatest proportion of the group variance they are the most appropriate functions for plotting the individuals and group centroids . Figure 8 presents the plot of the individuals' discriminant scores[20] that indicates the four adopter groups are clearly discriminated from one another on the two functions. The "best line" curve connecting all the centroids approximates a normal curve. The group centroids were used in the prediction of group membership of the individuals, where the individual's discriminant scores are compared to the centroids of the adopter groups. Individuals are

[20] Discriminant scores are calculated based on raw- score of the discriminators which are multiplied to the corresponding discriminant coefficients and summed.

assigned to the adopter group whose centroid has the most similar value to the individual's discriminant scores.

Table 14. Discriminant Functions at Adopter Group Centroids

	FUNCTION[1]		
ADOPTER GROUPS[2]	1	2	3
INNOVATORS	-1.4099	-1.329	-.218
EARLY ADOPTERS	-1.212	.673	.674
MAJORITY	.572	.491	-.246
LAGGARDS	3.180	-1.579	.256

[1] Centroids are unstandardized canonical discriminant functions evaluated at Adopter group means.
[2] 91.1% of the original grouped cases were correctly classified in the full discriminant model.

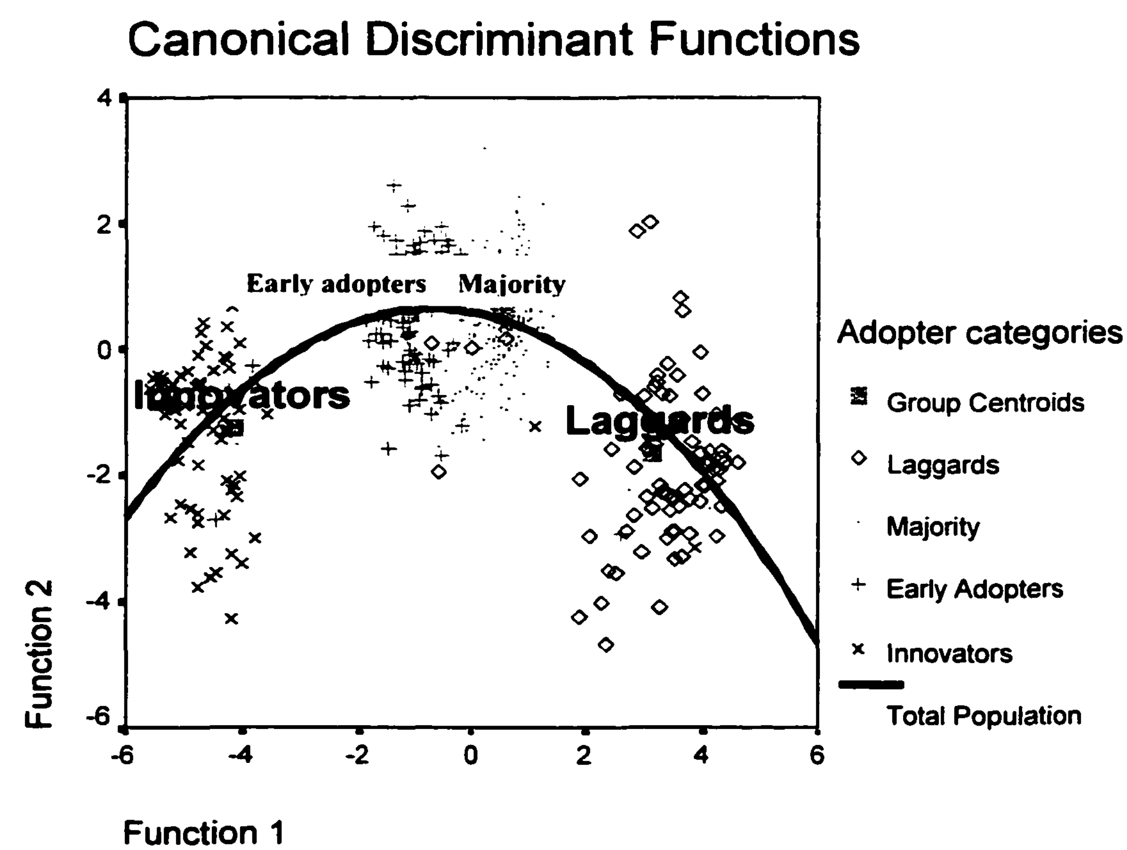

Figure 8. Plot of Group Centroids and Individual Discriminant Scores on Functions 1 & 2

Validation of Adopter Groups

The classification of individuals into adopter groups was carried out by a procedure that is set up to maximize the number of correct classifications of the cases originally classified. Since discriminant function analysis is a maximization procedure, it predicts the sample data analyzed well but might have problems on other samples. In other words, it might be difficult to generalize the functions to other populations. In order to assure that the functions obtained from the discriminant analysis were generalizable and valid, a cross validation procedure was carried out.

Table 15 presents the results for the double- split cross validation method. The total sample was divided in half and separate discriminant analysis was carried out on each half, where both sub-samples served as the developmental sample and the validation sample. In the first analysis 92.7 % of the analysis group cases were correctly classified as compared to the 89.5 % of the validation group cases that were correctly classified. In the second analysis, where groups were switched, 88 % of the analysis group cases were correctly classified as compared to the 90.5 % of the validation group cases that were correctly classified. Ninety one percent of the originally grouped cases were correctly classified in the full discrimination model.

Table 15. "Double Split Cross-Validation" Adopter Groups Classification Results

	PREDICTED ADOPTER GROUP MEMBERSHIP							
	INNOVATORS		EARLY ADOPTERS		MAJORITY		LAGGARDS	
	%	n	%	n	%	n	%	n
Analysis Group 1[1]								
Innovators	**97.0**	32	3.0	1	.0	0	.0	0
Early adopters	4.0	2	**82.0**	41	12.0	6	2.0	1
Majority	.7	1	.7	1	**96.6**	143	2.0	3
Laggards	.0	0	.0	0	11.4	5	**88.6**	39
Validation Group2[2]								
Innovators	**86.8**	33	.0	0	7.9	3	5.3	2
Early adopters	1.9	1	**79.2**	42	18.9	10	.0	0
Majority	.7	1	4.6	7	**94.7**	143	.0	0
Laggards	.0	0	3.0	1	12.1	4	**84.8**	28
DOUBLE SPLIT CROSS VALIDATION SWITCHING OF ANALYSIS AND VALIDATION GROUPS								
Analysis Group 2[3]								
Innovators	**86.8**	33	.0	0	7.9	15	5.3	2
Early adopters	3.8	2	**67.9**	36	28.3	15	.0	0
Majority	.7	1	2.6	4	**96.7**	146	.0	0
Laggards	.0	0	.0	0	18.2	6	**81.8**	27
Validation Group1[4]								
Innovators	**97.0**	32	3.0	1	.0	0	.0	0
Early adopters	4.0	2	**72.0**	36	22.0	11	2.0	1
Majority	.7	1	2.0	3	**95.3**	141	2.0	3
Laggards	.0	0	.0	0	9.1	4	**90.9**	40

[1] 92.7 % of the analysis group 1 cases were correctly classified.
[2] 89.5 % of the validation group 2 cases were correctly classified.
[3] 88.0 % of the analysis group 2 cases were correctly classified.
[4] 90.5 % of the validation group 1 cases were correctly classified.

Table 16 reports the calculations for chance criteria for the adopter group classification. The maximum-chance criterion is the percentage correctly classified if all cases were allocated to the group with the greatest probability of occurrence, which would be the majority group (54 %). The proportional-chance criterion is calculated by squaring the proportions of each group. These criterions were used to compare to the percentage of correctly classified original cases in the full model, which was 91.1 %. Since C_{max} (54 %) is greater than C_{pro} (37 %), the maximum-chance criterion is the criterion to exceed. The correct classification of 91.1 % surpasses the C_{max} criterion considerably and supports that the discriminant model is valid.

Table 16. Calculation of Chance Criteria for adopter Group Classification

Adopter Groups[1]		Calculations
1. Innovators	$C_{innovators}$	$=(71/550) \times 100\ \% = 13\ \%$
2. Early Adopters	$C_{e.adopters}$	$=(103/550) \times 100\ \% = 19\ \%$
3. Majority	$C_{majority}$	$=(299/550) \times 100\ \% =$ **54 %**
4. Laggards	$C_{laggards}$	$=(77/550) \times 100\ \% = 14\ \%$
Maximum Chance Criteria	C_{max}	**=54 %**
Proportional Chance Criteria[1]	C_{pro}	$= (p_1)^2 + (p_2)^2 + (p_3)^2 + (p_4)^2$
		$= (.13)^2 + (.19)^2 + (.54)^2 + (.14)^2$
		= .37 or **37 %**

[1] 91.1% of the original grouped cases were correctly classified in the full discriminant model.
[2] p =the probability of cases being classified into group just by chance.

Hypotheses Testing

One-way ANOVA was used to test all hypotheses. The results for this section are explained in three subsections consisting of the comparison of adopter groups by (1) importance of natural resources condition scales, (2) natural resources value scales, and (3) quality of life principles. Each section will have an overall ANOVA statistic and the outcome of the hypothesis test.

Comparisons of Adopter Groups by Importance of Natural Resources Condition Scales to the Respondents' Well Being are presented in Table 17

All four variables had statistically significant differences ($p<.001$) on their mean score across adopter groups.

H1: ***Earlier adopters place higher importance on the effects of destruction of natural resources, which might affect their well being, than later adopters.*** The hypothesis was supported ($F=34.61$, $p=.001$). Innovators ($M=3.32$) and Early adopters ($M=3.28$) differed significantly from the majority ($M=2.62$) and laggards ($M=2.68$) groups on the variable destruction of natural resources. Although there were statistical significance, all four rated the destruction of natural resources as being "moderately important."

H2: ***Earlier adopters place higher importance on the effects pollution of natural resources, which might affect their well being, than later adopters.*** The hypothesis was supported ($F=248.31$, $p=.001$). Both the innovator ($M=3.66$) and early adopter ($M=3.57$) groups rated pollution as being "important" as compared to the majority ($M=2.63$) group that rated pollution as being "moderately important." The laggards(($M=2.39$) rated pollution as being "somewhat important."

H3: ***Earlier adopters place higher importance on the effects of extinction of flora and fauna, which might affect their well being, than later adopters.*** The hypothesis was supported (F=114.06, p=.001). The innovators (M=3.99) and early adopters (M=3.63) rated the extinction of flora and fauna as being "important" as compared to the majority (M=2.68), who rated as being "moderately important." The laggards (M=2.41) thought that this issue was "somewhat important" to them. Although, innovators and early adopters differed significantly on their means, substantively, the two groups thought that the issue was "important" to them.

H4: ***Earlier adopters place lower importance on the effects of losing agricultural land to natural resources, which might affect their well being, than later adopters.*** The hypothesis was supported (F=56.41, p=.001). Even though both innovators (M=1.56) and early adopter (M=1.58) differed statistically on their mean score to the majority (M=2.28) and laggard (M=2.48) groups, on the average, all four groups rated the loss of agricultural land as being "somewhat important."

Table 17. Comparison of adopter groups by importance of natural resources condition scales to the respondents' well being.

Variables[1]	Adopter Categories[2]: Innovators	Early Adopters	Majority	Laggards	F	p-value
Destruction of Natural Resources	3.32 [a] Moderately Important	3.28 [a] Moderately Important	2.62 [b] Moderately Important	2.68 [b] Moderately Important	34.61	.001
Pollution[4]	3.66 [a] Important	3.57 [a] Important	2.63 [b] Moderately Important	2.39 [c] Somewhat Important	248.31	.001
Extinction of flora & fauna	3.99 [a] Important	3.63 [b] Important	2.92 [c] Moderately Important	2.41 [d] Somewhat Important	114.06	.001
	1.56 [a]	1.58 [a]	2.28 [b]	2.48 [b]	56.41	.001

Loss of agriculture land[3]	Somewhat Important	Somewhat Important	Somewhat Important	Somewhat Important

[1] Variables for the scales were coded on a five point Likert scale; 1= not important: 2=somewhat important; 3= moderately important; 4=important; and 5= very important.
[2] All cell entries are means and means with different superscripts across the rows differ significantly at p <.001. Scheffe was used for the post hoc test.
[3] This variable is not a scaled index, it's a single item indicator coded on a five point Likert scale, identical to the scale described above.
[4] Example for interpreting the superscripts: means on the item pollution for the innovator and early adopter did not differ statistically between them but both means differed when compared to the majority and laggards groups. The means for the majority and laggards groups differed significantly between them at p<.001 and F=248.21.

Comparisons of Adopter Groups by Natural Resources Value Scales are Presented in Table 18.

Three of the four variables, tested, had statistical significance at p< .001 across the means of adopter groups.

H5: ***Earlier adopters value natural resources more for enjoyment than later adopters.*** The hypothesis was supported (F=45.10, p=.001). Innovators (M=3.10), early adopters (M=3.01) and majority (M=2.54) all rated enjoyment of natural resources as being "moderately important." The laggards (M=1.94) rated the item as being "somewhat important."

H6: ***Earlier adopters value natural resources more for preservation than later adopters.*** The hypothesis was supported (F=179.48, p=.001). The majority (M=2.68) and laggards (M=2.66) differed statistically to the innovators (M=3.71) and early adopter (M=3.44) on their mean score for the preservation of natural resources. Innovators rated preservation of natural resources as being "important" while the other three group rated it as being "moderately important."

H7: ***Earlier adopters value natural resources more for income than later adopters.*** The hypothesis was not supported (F=1.54, p=.202). All four groups rated income values of natural resources as being "important:" innovators (M=4.00), early adopters (M=3.90), majority (M=3.91), and laggards (M=3.80).

H8: ***Earlier adopters value natural resources more for conservation of air and water quality than later adopters.*** The hypothesis was supported (F=20.61, p=.001). Innovators (M=3.96) and early adopters (M=3.48) rated conservation of air and water as being "important." The majority (M=3.38) and laggards (M=3.21) rated the item as being "moderately important."

Table 18. Comparison of adopter groups by natural resources value scales.

	Adopter Categories[2]				**F**	**p-value**
Variables[1]	**Innovators**	**Early Adopters**	**Majority**	**Laggards**		
Enjoyment of Natural Resource	3.10 [a] Moderately Important	3.01 [a] Moderately Important	2.54[b] Moderately Important	1.94 [c] Somewhat Important	45.10	.001
Preservation of Natural Resource	3.71 [a] Important	3.44 [b] Moderately Important	2.68 [c] Moderately Important	2.66 [c] Moderately Important	179.48	.001
Income	4.00 [a] Important	3.90 [a] Important	3.91 [a] Important	3.80 [a] Important	1.54	.202
Conservation of air & water quality[3]	3.96 [a] Important	3.48 [b] Moderately Important	3.38 [bc] Moderately Important	3.21 [c] Moderately Important	20.61	.001

[1] Variables for the scales were coded on a five point scale; 1= not important; 2=somewhat important; 3= moderately important; 4= important; and 5= very important.
[2] All cell entries are means and means with different superscripts across the rows differ significantly at p <.001. Scheffe was used for the post hoc test.
[3] Example for interpreting the superscripts: means on the item "conservation of air and water quality" for the innovators and early adopters did not differ statistically but means for both groups differed significantly to the means of the majority and laggard groups. The means for the majority and laggards group were statistically alike at p <.001 and F=20.61.

Comparisons of Adopter Groups by Variables Important to Respondents' Quality of Life Principles are Presented in Table 19.

Eight of the 12 items tested were statistically significant at $p < .001$. The four variables that were not statistically significant in the analyses were education for children, transportation needs, religion, and money.

H9: ***Earlier adopters place higher importance on air quality to their quality of life principles than later adopters.*** The hypothesis was supported (F=155.12, p=.001). Innovators (M=4.28), early adopters (M=4.32) and majority (M=3.45) rated air quality as being "important" and all three had means that were statistically different from the laggards (M=2.42), who rated air quality as being "somewhat important."

H10: ***Earlier adopters and later adopters place the same amount of importance on family time to their quality of life principles.*** The hypothesis was only partially supported (F=18.07, p=.001) because The majority group's mean (M=3.76) differed statistically with the means for innovators (M=4.17) and early adopters (M=4.19). The mean for laggards (M=4.19) did not statistically differ from innovators (M=4.17) and early adopters (M=4.19). All four groups rated the item as being "important."

H11: ***Earlier adopters place higher importance on clean rivers to their quality of life principles than later adopters.*** The hypothesis was supported (F=145.48, p=.001). Innovators (M=4.52) and early adopter (M=4.52) rated clean rivers as "very important" and the differences of the means between them and the other two groups, majority

(M=3.54) and laggards (M=2.84), were significant. The means for majority and laggards were different statistically.

H12: ***Earlier adopters and later adopters place the same amount of importance on children's education to their quality of life principles.*** The hypothesis was supported (F=.03, p=.991). All four groups rated education for children as being "very important"(innovators (M=4.51), early adopters (M=4.51), majority (M=4.52), and laggards (M=4.53)).

H13: ***Earlier adopters and later adopters place same amount of importance on transportation needs to their quality of life principles.*** The hypothesis was supported (F=.52, p=.669). All four groups rated transportation needs as being "important" (innovators (M=3.90), early adopters (M=3.90), majority (M=3.86), and laggards (M=3.97)).

H14: ***Earlier adopters and later adopters place same amount of importance on religion to their quality of life principles.*** The hypothesis was supported (F=.20, p=.899). All four groups: innovators (M=4.54), early adopters (M=4.53), majority (M=4.53), and laggards (M=4.58) rated religion as being "very important."

H15: ***Earlier adopters place higher importance on the natural environment to their quality of life principles than later adopters.*** The hypothesis was supported (F=84.26, p=.001). Statistically, means for all four groups differed between each other.

Innovators (M=4.01) rated natural environment as "important." Early adopters (M=3.33) and majority (M=3.06) rated natural environment as "moderately important." Laggards (M=2.44) rated natural environment as "somewhat important."

H16: ***Earlier adopters and later adopters place same amount of importance on money to their quality of life principles.*** The hypothesis was supported (F=2.59, p= .052). All four groups rated money as being "very important" (innovators (M=4.42), early adopters (M=4.49), majority (M=4.59), and laggards (M=4.54)).

H17: ***Earlier adopters place higher importance on recycling practices to their quality of life principles than later adopters.*** The hypothesis was supported (F=71.07, p=.001). Statistically, means for all four groups differed between each other. Innovators (M=3.73) rated recycling practices as "important." Early adopters (M=3.03) and majority (M=2.54) rated recycling practices as "moderately important." Laggards (M=1.96) rated recycling practices as "somewhat important."

H18: ***Earlier adopters place higher importance on modern home appliances to their quality of life principles than later adopters.*** The hypothesis was supported (F=80.21, p=.001). Statistically, means for all four groups differed between each other. Innovators (M=3.80) rated modern home appliances as "important." Early adopters (M=2.84) and majority (M=2.55) rated modern home appliances as "moderately important." Laggards (M=1.90) rated modern home appliances as "somewhat important."

H19: ***Earlier adopters place higher importance on wildlife to their quality of life principles than later adopters.*** The hypothesis was supported (F=73.81, p=.001). Statistically, means for all four groups differed between each other. Innovators (M=3.54) rated wildlife as "important." Early adopters (M=2.81) rated wildlife as "moderately important." Majority (M=2.39) and Laggards (M=2.03) rated wildlife as "somewhat important."

H20: ***Earlier adopters place higher importance on wealth to their quality of life principles than later adopters.*** The hypothesis was supported (F=31.92, p=.001). Innovators (M=3.13), early adopters (M=3.14), and majority (M=3.02) have means that are statistically alike between them but their means differed statistically when compared to the mean of the laggard (M=2.17) group. Laggards rated wealth as being "somewhat important" and the other three adopter groups rate it as being "moderately important."

Table 19. Comparison of adopter groups by variables important to respondents' quality of life principles.

Variables[1]	Adopter Categories[2] Innovators	Early Adopters	Majority	Laggards	F	p-value
Air Quality	4.28[a] Important	4.32[a] Important	3.45[a] Moderately Important	2.42[b] Somewhat Important	155.12	.001
Time to spend with family	4.17[a] Important	4.19[a] Important	3.76[b] Important	4.19[a] Important	18.07	.001
Clean Rivers	4.52[a] Very Important	4.52[a] Very Important	3.54[b] Important	2.84[c] Moderately Important	145.48	.001
Education for children	4.51[a] Very Important	4.51[a] Very Important	4.52[a] Very Important	4.53[a] Very Important	.03	.991
Transportation needs	3.90[a] Important	3.90[a] Important	3.86[a] Important	3.97[a] Important	.52	.669
Religion	4.54[a] Very Important	4.53[a] Very Important	4.53[a] Very Important	4.58[a] Very Important	.20	.899
Natural Environment	4.01[a] Important	3.33[b] Moderately Important	3.06[c] Moderately Important	2.44[d] Somewhat Important	84.26	.001
Money	4.42[a] Important	4.49[a] Important	4.59[a] Very Important	4.54[a] Very Important	2.59	.052
Recycling Practices	3.73[a] Important	3.03[b] Moderately Important	2.54[c] Moderately Important	1.96[d] Somewhat Important	71.07	.001
Modern home appliances	3.80[a] Important	2.84[b] Moderately Important	2.55[c] Moderately Important	1.90[d] Somewhat Important	80.21	.001
Wildlife	3.54[a] Important	2.81[b] Moderately Important	2.39[c] Somewhat Important	2.03[d] Somewhat Important	73.81	.001
Wealth / being wealthy	3.13[a] Moderately Important	3.14[a] Moderately Important	3.02[a] Moderately Important	2.17[b] Somewhat Important	31.92	.001

[1] Variables were coded on a five point Likert scale; 1= not important; 2=somewhat important; 3= moderately important; 4= important; and 5= very important.

[2] All cell entries are means and means with different superscripts across the rows differ significantly at p <.001. Scheffe was used for the post hoc test.

[3] Examples for interpreting the superscripts: means on the item "air quality" for innovators, early adopters, and majority groups did not differ statistically but all three means differed statistically to the mean of the laggard group.

Summary of Findings

The summary of the findings is presented according to the achievement of study objectives.The overall response rate for the study was 97.4 % (N=550). The gender ratio for the study sample was close to 50:50, their average age was 33 years, and 78.5 % of the respondents grew up either in a small or large town. Fifty four percent of the respondents had completed at least some tertiary education and 75 % of the respondents earned a monthly income of between RM$1,001.00 and RM$3,000.00. Ninety percent of the respondents were aware of the river pollution problems in Malaysia. Almost 40 % of the respondents said that neither the government nor the mass media were effective in their protection and conservation efforts of the natural resources and another 43 % said that they were not sure. About 50 % of the respondents rated education for their children, religion, and money as very important to their quality of life principles. About 70 % of the respondents rated the natural environment and recycling practices as somewhat to moderately important to their quality of life principles. Religion (52 %), and family time (33 %) were the two most important items to their quality of life principles.

Development of a Descriptive Profile for the Four Adopter Groups

As predicted by the theory of Diffusion of Innovation (Rogers, 1995), most of the people surveyed represented the majority group, which was 299 (54.4 %) cases, followed by early adopters with 103 cases (18.7 %), innovators with 71 cases (12.9 %), and laggards with 77 cases (14.0 %). The distribution of the sample based on the four adopter groups mirrored a normal or bell shaped distribution, which was one of the diffusion of innovations indicator criteria (Rogers, 1995).

Laggards (41 years), on the average, were significantly older than innovators (31 years), early adopters (31 years), and majority (32 years) The greater percentage of innovators (78 %), early adopters (67 %) and majority (56 %) had some level of tertiary education and earned higher salaries as compared to the laggards (9 %). Seventy one percent of the laggards earned between RM$500.00 and RM 1000.00 a month, which is the lowest income bracket in the study About 75 % of the respondents in each adopter group grew up in either a small or large town.

Almost all the respondents in each group were aware of the river pollution issues: innovators (99 %), early adopters (99 %), majority (87 %), and laggards (82 %).

There were a higher percentage of laggards (more than 65 %) and majority (more than 55 %), as compared to innovators (less than 5 %) and early adopters (about 12 %), who were <u>not sure</u> about the Malaysian government and mass media's involvement in the natural environment's conservation and protection efforts.

Discrimination of the Adopter Groups Across Predictor variables that Best Explain the Group Differences, and Validation of the Self Reported Adopter Group Memberships

The personality scales constructed as predictor variables to discriminate adopter groups showed very promising internal consistency reliability (Cronbach's Alpha's were between .88 and .93 for all four scales). The discriminant functions passed all the traditional evaluation requirements (see Table 12 for details of evaluations) with a high degree of confidence. Function 1 had a canonical correlation of .90 and a Wilk's Lambda of .09 (χ^2 =1269.53, df = 21, p = .001)

Function 1 accounted for 81 % of the relative variance in the discriminator variables that predicted the groups and 58 % of the absolute variance in the predictor variables. Function 1 is a personality function, which is controlled, mainly, by two personality traits. The personality traits of dogmatism (coefficient = .34) and fatalism (coefficient = .44) accounted for most of the variance in function 1, and they were the key discriminator variables that predicted adopter group differences in the study.

Both the "double split Cross-validation" and the "chance criteria" strategies provided the discriminant function model positive validations and the full discriminant model correctly classified 91.1 % of the originally grouped cases.

Comparison of the Four Adopter Groups Across Variables Related to Environmental Issues on Values, Importance of Natural Resources and Quality of Life Principles.

The importance of natural resources scales which included extinction of plant and animals (Cronbach's Alpha = .78), pollution (Cronbach's Alpha = .62), and destruction of natural resources (Cronbach's Alpha = .48) had reasonable internal consistency reliability. Innovators and early adopters both rated pollution and extinction of flora and fauna as <u>important</u> to their well being as opposed to the majority and laggards who rated the items as <u>moderately important</u>. All four groups rated the destruction of natural resources as <u>moderately important</u> to their well being. All four groups rated the loss of agriculture land as <u>somewhat important</u> to their well being.

The natural resources value scales of enjoyment of natural resources, preservation, conservation, and income had Cronbach's Alpha values of .89, .64, .51, and .60, respectively. Innovators value preservation of natural resource, and conservation of air and water quality as <u>important</u>. Early adopters and the majority value conservation of air and water quality, preservation of natural resource, and enjoyment of natural resource as <u>moderately important</u>. The laggards value preservation natural resources and conservation of air and water quality as moderately important and they value the enjoyment of natural resource as somewhat important. All four groups value income from natural resource (tourism and mining) as important.

When it came to their "quality of life" principles, only innovators placed higher importance on the conservation issues. The laggards thought that conservation issues were only "somewhat important" to their quality of life principles as opposed to religion and education for children, where all groups rated the two items as "very important." Innovators and early adopters thought that clean rivers were "very important" to their quality of life. The majority group rated most of the environmental issues as being "moderately important."

CHAPTER V

IMPLICATIONS

The results of the study have a variety of implications. This chapter discusses the implications for (1) Marketing, (2) Interpretation as a management tool, (3) Environmental education in the public school system, (4) Planning and policy of environmental agencies, and (5) Future research.

Marketing

The average public does not exist. The study revealed that for a given sample, segments or groups of people were identified based on selected characteristics that were of importance to an issue. This study segmented the Kedah Malays using the adopter characteristics (Rogers, 1995) of the diffusion of innovation model related to environmental issues in Malaysia. Segmentation of the public into adopter categories has provided valuable information about each group's personality characteristics, their tendencies on environmental issues, quality of life principles, and familiarity on related issues of concern for the study. Knowing this information about the various segments of public that exists, how can it be used effectively to market environmental products[21].

As discussed previously in the review of literature (Chapter II), the traditional marketing of consumer products tend to target the segments that most likely could afford a product or segments that are willing to try new products in market place. In the case of this study, the targets for the marketers would be the innovators and the early adopters. It

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[21] The word product here is used synonymous with interpretation strategies such as personal (i.e., nature walk and talk, slide show presentation, and so) and non-personal products (i.e., wayside exhibits, posters, interactive displays, brochures and publications, documentaries and so on.).

is apparent that the marketers like the high level of innovativeness that these two adopter groups have and their willingness to try out new products. The people in consumer product marketing tend to pay more attention to innovators and early adopters when they market their products because the probability of successful sales to this group is much higher, as compared to laggards. Laggards are less likely to take the risk of purchasing an innovation. It is different when it comes to environmental issues because segments that lag on selected issues are of the greatest interest to the marketers of environmental "products." It would be a "breeze" to convince the already convinced, namely the innovators and the early adopters.

Since the average public does not exist, the implication for marketers of environmental "products" would be to consider the various adopter groups when devising an effective marketing mix. Marketing mix includes various forms environmental products such as personal and non-personal strategies. Marketers need to understand the needs and ability of the various adopter groups when positioning various environmental "products". Like in the traditional market place, the environmental "products" will also face competitions from competing products, but in this case the competition is from the very people to whom the market is trying to provide the "products." The competition is in the form the people's actions, perceptions, attitudes and behavioral tendencies towards environmental issues. Since each adopter group has their own signature characteristics, "products" need to be positioned differently to the different groups. The correct adjustments need to be made to type of medium used and appropriateness of the channels selected to convey the "products." Figure 9 suggests type of message and media suitable for different adopter groups.

	Earlier Adopters	Later Adopters
Messages	• Messages with shared values based environmental issues. • More complex and detailed information on issues are needed. • Messages that can keep the people interested and involved in environmental issues would be effective.	• Messages that can relate or link shared values to peoples experience and personality. • Simple and practical information that can be understood easily. • Messages that provide solutions and benefits to the people on environmental issues.
Media	• Non personal -Brochures -Booklets -Exhibits	• Personal preferred. -Local Change Agents -Local Opinion Leaders

Figure 9. Matrix suggesting type of messages and media suitable for adopter groups

The implication for communication strategies is that adopter groups would behave differently to different media channels. For example, according to Rogers (1995), earlier adopters tend to place higher importance on mass media channels[22] than interpersonal channels[23] as compared to later adopters. Since earlier adopters are more cosmopolite than later adopters, cosmopolite channels are relatively more important than localite channels for earlier adopters than later adopters (Rogers, 1995). Earlier adopters possess a more venturesome orientation, so the mass media message stimulus is enough to move them over the mental threshold to the adoption of a new product. The less change-oriented later adopters require a stronger and immediate influence, like that from interpersonal networks to adopt a new product (Rogers, 1995).

[22] Mass media channels are means of transmitting messages involving a mass medium such as radio television, news papers, and so on, that enable a source of one or a few individuals to each an audience of many.
[23] Interpersonal channels involve a face-to-face exchange of information between two or more individuals.

Change agents[24] play an important role on the various adopter groups in environmental campaigns. At times, it would be beneficial for change agents to delegate the work to, or work together with, local opinion leaders on environmental campaigns when dealing with later adopters like the laggards. Laggards tend to have better relationship with local opinion leaders than cosmopolite change agents. Laggards tend to trust their local interpersonal communications network (Rogers, 1995). The best option would be to have a local change agent. " The opinion leader's interpersonal networks allow him or her to serve as a social model whose innovative behavior is imitated by many other members of the system"(Rogers, 1995).

Interpretation as a Management Tool

The field of Environmental Interpretation is relatively new in Malaysia. Therefore, all new interpretive plans or strategies must be related to the local environment. One of the justifications of this study was to provide environmental interpreters the necessary information on how to understand and treat their potential audiences. The programming efforts must target specific groups. The traditional way of understanding an audience was to look at demographic compositions or socio-economic variables. The shortfall of these strategies is that most of the formerly mention variables tend not to correlate well with behavioral determinants. The results in this study indicate that both the income and education level predictor variables were poor predictors of adopter groups during the discriminant function analysis. Therefore, looking at demographic and socio-economic variables alone does not provide much useful information for determining group characteristics. How do people's personality affect

[24] A change agent is an individual who influence peoples' innovations-decisions in a direction deemed desirable by a change agency (Rogers, 1995).

their tendencies towards various environmental issues? This study was designed to discriminate the public into various adopter categories using various personality traits as described by Rogers (1995), and later analyzes the categories' characteristics and tendencies on environmental issues.

At least in the short term, we now know how the different adopter groups react differently to environmental and conservation issues put forward to them in this study. The findings indicate that the people in the majority and, especially, laggard groups were less favorable towards conservation and environmental issues. Implication on the group that needs immediate attention. This information will help managers, administrators, community leaders, and politicians, to devise and provide better-targeted interpretation strategies and support in the conservation efforts of Malaysia's natural areas. Taking into consideration the limited budget and personnel relevant agencies should concentrate their efforts in developing effective programs for the later adopters.

The management and site supervisors of natural recreational settings in Malaysia need to capitalize on the opportunities to educate captive visitors at recreational sites. The most common destinations for local visitors are the amenity forests, which are normally associated with waterfalls, rivers or other water resources. There are currently about 80 such recreational forests throughout the country and these are relatively small areas receiving high numbers of visitors, the majority of whom are day users. Although the majority of visitors come to enjoy the water features and have family picnic, interpretation programs should be made available to all visitors so that they become more familiar and sensitive towards the natural environment. It is critical to provide programs that suit the various groups or at least make sure that the programs can effect the later adopter groups. This is because the earlier adopters are already familiar with issues and are hungry for new information. The later adopters tend to place less importance to environmental issues.

Unless effective programs, designed specifically for later adopter, are offered, later adopters are not going to benefit in the environmental sense from their visits to the natural areas. Managers and interpreters need to capitalize on teachable opportunities with captive audiences by making the correct choices on program selection and mode of delivery (i.e., personal or non-personal interpretation).

Interpretative programming implications for earlier adopters visiting natural areas. Earlier adopters place greater importance on environmental issues. There are people who visit the parks and natural areas in Malaysia because they want to be in a place where the environment is clean and refreshing. In other words, the visitors care about their environment and are open to the idea of learning new ideas. Managers and interpreters must be careful when providing programs and information to people that are, to a certain extent, well-informed on environmental issues so as not to bore them with trivial information designed for later adopters. Wayside displays for example need to have enough basic and some advance information that relates to all levels of adopter groups. To achieve this management of natural recreational areas need to employ and train qualified interpreters on the existence of the diverse adopter groups or other feasible group categorization. It is important that managers and planners of natural areas acknowledge the diversity that exists among their visitors and begin to understand the value of addressing issues related to this diversity.

Interpreters must find creative ways for the various segments when forwarding agency's policies and agendas to the visiting public besides presenting resource and environmental issues. Visitors need to see the overall picture as well the smaller niches of environmental issues. People need to feel that their personal actions are meaningful and can affect the overall picture of environmental conditions. Therefore, they can only achieve this feeling if they are well informed, aware of their surroundings, and familiar with environmentally related issues, including management goals, national policies and social expectations. Interpretation needs to provoke rational thinking, relate to the individual's personality, reveal nature's secrets, be an interesting art form, and present an overall picture, but most importantly it must be appropriate for the specific audience (Tilden, 1977).

Environmental Education in the Public School System

This study revealed some insights into the importance of understanding audience segmentation and how segmentation can help the people understand environmental issues in the long run. The study has major implication on environmental education in the Malaysian public school system. The findings indicate that less educated people were more likely to be categorized as laggards, who showed poor affinity towards environmental issues. The ministry of education in Malaysia needs to look into the possibility of introducing environmental education at an earlier stage in a child's school career. The study showed that later adopters tend to have lower level of education, which means that they left school early. The implication here is that most of the people drop out of the school system early before getting the chance to be exposed to environmental education. The goal would then be to make sure that all students in the national school system get some level of exposure to environmental issues and conservation ideas earlier in their school career. So, even if the students drop out from school earlier than expected they would have had some basic, maybe even more advanced, understanding of environmental issues. Potentially, the early school dropouts could be later adopters who might react favorably to local conservation and environmental issues because of their exposure to environmental education while in school. People with knowledge about the environment and conservation issues will tend to relate better to the issues than those with less environmental knowledge.

Academic experts in the country should consider implementing more effective environmental educational content in various parts of the public school curriculum. Schools in Malaysia, especially in primary schools, must provide more of an experiential type (hands-on) environmental education style when attempting to reach out to younger audience, who are early in their development stages. The current strategy for teachers teaching in Malaysian schools involves the traditional pedagogy where the teachers teach and the students listen. There is very little teacher-student discourse, interaction or hands-on opportunity for the students to experience. For environmental education to work in the Malaysian schools, there need to be different strategies for the different learning styles of the students, especially those in their experiential early years. Environmental education should go hand-in hand with Tilden's (1977) five interpretive principles as previously described. Students can belong to different adopter categories as well. Grassroots level campaign in schools should be able to yield more "earlier adopters," who would be able to understand environmental issues in the future. Today's children are tomorrow's generation and today's ideas can become tomorrow's ideals!

Planning and Policy

The grouping of cases into adopter categories in this study also revealed that it is possible to predict people's group affiliation based on their answers to a few relevant questions. This means that the discriminant function facilitates the classification of new members. Knowing people's group affiliation will help managers deal with various situations better, since they can now predict people's tendencies and likings on issues based on the study's generalizability. There is implication on the decision making publics. Planners and policy makers can now know ahead of time the various publics that they have to deal with concerning certain issues based on predictive segmentation models discussed previously. Public involvement is essential in decision-making and policy formulations for environmental issues. Instead of just getting input from innovators and early adopters at public meetings, managers must now find ways to attract the later adopters to these public hearings. This is shown by the results in this study where later adopters tend to place less importance on environmental issues. Public involvement in environmental issues should include all segments of the public. Managers must also provide relevant information to everyone, which means using different strategies of communication for the different groups present, so that everyone can make informed decisions on issues at hand. For example manages can use local change agents and opinion leaders to influence and educate later adopters so that they are involved in decision making processes.

Public involvement in decision-making processes in a collectivistic culture like Malaysia must consider the use of peer networks within social units. Later adopters in particular need constant reference and reassurance from their peers before decisions are made on adoption of an innovation (Rogers,1995). If planners and policy makers wish to educate and keep later adopters informed, they need to use local opinion leaders as their field lieutenants or change agents to infiltrate the social network and convey relevant messages. As discussed earlier in this chapter, later adopters prefer to learn about innovations from their peers through personal communication strategies as compared to earlier adopter who can be reached through non-personal communication.

This study, not only produced groups or segments but it presented a means to understand between group differences. Just imagine looking at the frequencies of overall 550 cases on environmental issues or personality variables, how much information can one make sense of and put to good management use. As discussed earlier, there is no such thing as a general public. When the frequencies for adopter groups are looked at on the various variables, a clearer picture of what the groups of people represent is revealed. The adopter group's tendencies are identified for different conservation and environmental issues. Each identifiable group has its own characteristics that give it a unique identity. The groups' unique characteristics allow planners and managers the proper ammunitions when positioning environmental and conservation products (i.e., programs, talks, brochures, posters, extension work, etc.). Systematic scientific inquiry such as in this study will allow upper management of relevant environmental agencies in Malaysia to pinpoint strategic target populations and disseminate the appropriate environmental messages or ideas to the selected group prior to getting the people's input on decision-making process.

Political actions on environmental policy formulations should first acknowledge the existence of the various adopter groups. Environmental policies formulated should be practical and include all segments of the public. In order for any agency to achieve its goal on environmental policies, all segments of the public need to be given a fair chance to relate to and understand the policies. The Department of Environment Malaysia (DOE), for example, list the following as its environmental policy objectives under the heading education and awareness: (1) audio visual tapes and cassettes on environment, (2) public/private sector attachment training program, (3) public education and awareness posters, pamphlets and materials, and (4) environmental talks and exhibits (DOE, 2001). Yes, at first glance, these objectives seem adequate, but actually, all the printed materials were designed to be used on the so-called, non-existent, general public. Furthermore, these material and educational programs are only used during special occasions like the yearly event of Malaysian environment week, normally held in urban setting, which tends to attract innovators and early adopters who are familiar with environmental issues.

This study revealed that the later adopters were less familiar with environmental issues based on their "not sure" response to the government and mass media's roles on environmental issues in the survey. Governmental and NGOs alike need to reach out to all the sectors of the public, in order to promote, enhance, and sustain sound environmental practices across all levels of people in the nation. Organizations need to understand and know their audience clearly before any decision is made to educate or inform the "non general public."

Environmental stewardship should play an important role for the future of the natural environment in Malaysia. The DOE of Malaysia's environmental policy objectives are geared towards social and cultural progress and the enhancement of the quality of life of the Malaysian people through environmentally sound and sustainable development. All sectors of the Malaysian people need to be informed about the agency's strategies, and the messages or information need to be designed to suit the various groups by selecting the appropriate media type, communications channels, change agents, and networks. Only then, will all the different people within a system be able to become active stewards of the environment, especially, once they have become familiar and "gained ownership" of their environment. Political actions on environmental policy formulations should first acknowledge the existence of the various adopter groups. Environmental policies formulated should be practical and include all segments of the public. In order for any agency to achieve its goal on environmental policies, all segments of the public need to be given a fair chance to relate to and understand the policies. The Department of Environment Malaysia (DOE), for example, list the following as its environmental policy objectives under the heading education and awareness: (1) audio visual tapes and cassettes on environment, (2) public/private sector attachment training program, (3) public education and awareness posters, pamphlets and materials, and (4) environmental talks and exhibits (DOE, 2001). Yes, at first glance, these objectives seem adequate, but actually, all the printed materials were designed to be used on the so-called, non-existent, general public. Furthermore, these material and educational programs are only used during special occasions like the yearly event of Malaysian environment week, normally held in urban setting, which tends to attract innovators and early adopters who are familiar with environmental issues.

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Cultural reinforces such as education, religion, and family (Samli, 1995; Samli, Richard, & John, 1993) can play an important role in making conservation of natural environment more attractive to particular segments. Culture determines behavior patterns and provides stability to a society. Cultures advocate certain behavior and instill values in people that plays significant role in the overall behavior and stability of the society (Samli, 1995). According to Samli (1995) culture also provides and reinforces certain power structures in a society. Since the results indicate that all the groups rated religion, education for children and time spend with family as being "very important," we could work the elements of conservation and preservation into the cultural reinforces. These reinforces tend not to change easily because they are cultural in nature. The study also revealed that laggards rated conservation and environmental issues as "<u>somewhat important</u>" and they tend to earn less money and were less educated than earlier adopters. Agencies could target these groups and provided them with the opportunities to learn more about the environment, with incentives and benefits built into it. These incentives could be in many forms such education opportunity for their children, cleaner and saver environment for their family and reiterate religious demands towards the environment. Managers need to capitalize on these elements (family, education and religion) that people care most about, even to the extend of using healthy scare tactics in positioning various environmental programs. Planners and policy makers need to bait and hook the various groups with cultural reinforcers in the context of environmental issues. Environmental issues need to be related to the personality and the experiences of the people, especially the later adopters, to get their attention before providing them with useful information.

Since the earlier adopters are already aware and place high importance on environmental issue, agencies just need to provide relevant and useful environmental information to them, to keep them informed and to reinforce the pro-environment behavior. In this way, they are kept up to date with the latest information and agencies can garner their support to spread the message to their peers, especially the laggards. We know form the literature (Rogers, 1995) as described in chapter II that some innovators and most early adopters are opinion leaders in their communities, and later adopters (majority and laggards) are always looking to these groups for guidance and assurance when adopting new ideas.

Even though this type of study on segmentation might look miniscule and unimportant to managements of local environmental agencies, who, for the most part are unfamiliar with the practicality of such methodologies in interpretation and communication, constant exposure to the benefits and positive outcomes of this method should eventually convert non-believers into believers in audience segmentation. Who knows, maybe, one day soon, we will see more "innovator" type managers with burning desires to try new approaches that will help in the conservation efforts of Malaysia's natural environments.

Implication of adopter groups to NGOs. Almost all of the environmental NGOs' time spent working in Malaysia was spent on dealing with either fighting government's policies or devising management strategies for the physical resources in collaboration with local agencies. The NGOs have done very little to infuse interest and garner public support for the conservation of natural resources in Malaysia. This study provides preliminary information on the public's view on environmental issues. Segmenting the public into different adopter categories provided valuable information on the various adopter group's characteristics. Knowledge of the varied characteristics should open the door for the NGOs to work directly with various publics on environmental issues. NGOs in Malaysia need to be visible to the people and provide opportunities for people to understand their causes and actions related to environmental issues, so that the varied public can join with the NGOs to achieve environmental sustainability. If need be, NGOs must allow policy change to include the various publics in their environmental conservation efforts. NGOs have to train their staff to deal with campaigns for the people at the grassroots level when advocating behavioral changes or conservation practices.

NGOs must emphasize environmental education and awareness for the various groups of people in Malaysia in their policies. If the NGOs do not care about the people, why should the people care about the NGOs and their causes? NGOs need to be less political and spend more time orienting the people by education, if they want to survive in the business of environmental advocacy with the people's support.

Besides looking at the Malaysian context, we should also address the regional possibilities, where ASEAN[25] countries are concerned. For starters, countries that share common borders with Malaysia, Thailand and Indonesia, who have similar natural resources issues could have joint efforts among the relevant environmental agencies, across borders, in combating environmental problems at a grassroots level. It is important to note that people living along international borders share common characteristics on various environmental issues. Most of the time, the people living in border communities have relatives and family members on either side of the common international borders. Any actions taken in the direction of conservation or protection should be reciprocated across the borders too because if only one side of the border is advocating conservation efforts, those efforts will soon fade away as a result of inconsistent implementation of programs in the neighboring countries. The implication here is that studies should be conducted on both sides of the common borders so that nations can jointly implement conservation efforts for the border communities of both countries. Similarly, audience segmentation studies on both sides of the border could also help managers to validate and to learn more about the similarities and differences of people's characteristics and environmental tendencies. Managers from both sides of the borders can share strategies

[25] Association of Southeast Asian Nations consisting of Malaysia, Brunei, Laos, Cambodia, Indonesia, Myanmar, Philippines, Singapore, Thailand, and Vietnam

on common ideas. The key thing is that they need to know their audience better by using systematic scientific techniques to help them deal with various homogenous groups with regard to the people's environmental tendencies.

Future Research

Research in the future should consider testing other personality variables besides the ones used in this study. This will allow for the discovery of new personality variables that are more sensitive to the local conditions and predict adopter groups with greater consistency. Future research should also attempt to identify new adopter group categories other than the standard adopter group explained by Rogers (1995), which fits the local collectivistic culture. In order to achieve this, studies targeted at adopter groups should be designed to find out more about the characteristics of each group, asking questions that are more specific on environmental issues related to specific attitudes, values, beliefs, and behaviors. The more specific the information obtained the more useful the information becomes to planners and managers in the implementation of environmental programs for the various groups.

This study must be replicated to other ethnic groups in Malaysia. Eventually, a generic instrument that will work for all Malaysians should be developed that has good construct validity. This is important because managers who wish to use this methodology in their parks need an instrument that is usable for all visitors and not just for a particular ethnicity. Future studies should also try to replicate this study, after further refinement, at neighboring countries to see if there are similarities or differences in environmental tendencies. Results could facilitate regional programs and activities on conservation efforts. ASEAN countries share common resources across borders, which could be jointly managed with specific goals and strategies based on outcome of adopter studies. This is important because each nation in ASEAN can contribute in different ways based on their resource availability and capability (i.e., funding, expertise, related agencies, and man power) in dealing with environmental issues. Limited resources of the nations can be put to effective use in environmental campaigns by having an understanding of the targeted groups that need support and information on environmental issues.

Methodology wise, future research should attempt to study at other diffusion of innovation elements such as "innovation decision process," "communications channels," "social structure and diffusion," systems norms and diffusion," and "opinion leaders and change agents." These studies would reveal beneficial information to further understand adopter groups characteristics and possibly provide better solutions to improving environmental campaigns in Malaysia. Future research should also consider true experimental designs that can test for the effectiveness of various environmental campaign strategies on the adopter groups. Longitudinal diffusion studies will aid in understanding of the rate of diffusion and effectiveness of environmental campaigns on the adopter groups.

Agencies, especially agencies dealing with environmental issues, must be convinced to use human dimension data and findings which can provide the means for more meaningful and effective conservation campaigns. These agencies base their campaigns purely on their environmental data that seldom include human dimension evaluations. Furthermore, promoting this type of study to the management of environmental and funding agencies might get some recognition and financial support.

Without their support very little can be accomplished, no matter how valuable the data from these studies are.

Conclusion

The purpose of this study was (1) to develop a descriptive profile of the four adopter groups, (2) to discriminate the four adopter groups across predictor variables that best explained the group differences and validate the self-reported group membership, and (3) to compare the four adopter groups across various dependent variables related to environmental issues on attitude, importance of natural resources, and quality of life principles.

The study found that the Kedah Malays could be classified into adopter categories based on both, the respondents' self-selection and the discriminant functions. The subjects in the study mirrored a normal distribution curve for adopter groups as described by Rogers (1995). The study identified personality variables that best discriminated for adopter group differences based on environmental issues. The adopter groups differed on the mean scores of various environmental issues but all four groups placed similar importance on the items religion, family time, and education for children.

The major implication for planners and managers when dealing with environmental issues is the value of segmenting people into adopter categories. This provides a more thorough and accurate view of the different groups and their unique characteristics. This leads to the view of devising a variety of communication strategies, and recognizing that each group has different characteristics. In the past, managers and planners have used intuition and experience to make decision concerning audience characteristics and needs. This study and future efforts can help provide useful information into the diverse characteristics and needs of each adopter group and provide a systematic way to understand audiences to assure the success of environmental campaigns in Malaysia.

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Appendix A

Survey Instrument

This study was designed to understand people's attitude towards environmental conservation issues in Malaysia. Your participation in this study is voluntary. There are no known risks to taking this survey, however, if you feel uncomfortable with any questions, you may skip them. The survey should take about 15 to 20 minutes to complete. The survey is completely anonymous and all reported results would be in aggregate form. Your opinion is very important to the success of this study.

Thank you for your help.
We really do appreciate your participation.

"In this survey, the words "natural areas" and natural environment will be used interchangeably. For the purpose of this study "natural areas" and "natural environment" are defined as all types of, rivers, lakes, mangroves, mountains, hills, beaches, islands and forested land."

For each question, please circle just one answer that best reflect your response to it. Remember there are no right or wrong answers; just respond to the questions sincerely.

Question 1.

Lately there have been many issues raised regarding the pollution of our rivers.

A. Are you aware of this problem? **YES [ ] / NO [ ]**

The public, which includes you and I, is said to be one of the major contributors to this problem. We have been discarding all kinds of waste materials into our drain system. Now, lets assume that the government has come up with a new waste disposal strategy, which if adopted by the public could alleviate some of the river pollution problems in the future. This new strategy is just a recommendation by the government and is not required by the law. Therefore, it's up to you if you want to practice this new domestic waste disposal strategy or not. There is **no right** or **wrong answer** for this question. So, please answer based on how you feel about making changes to your existing practice of waste disposal voluntarily, taking into account that this change might cost you bit more, but at the same time it helps keep the rivers cleaner.

B. Please be sincere when choosing the statement that best describes how you would react to this new waste disposal method?

A. I will probably be the first one to try this new method, since it helps clean our rivers.
B. I will probably try out this new method after I study the details and be a role model to provide information to others.
C. I will try out this new method if most of the people around me have already adopted this new method.
D. I will most likely not change the way I dispose off my domestic waste now, unless, it's required by the law.

Question 2. In your opinion, do you think that the Malaysian Government has taken appropriate actions to help protect and conserve the natural environment?

YES [ ] NO [ ] NOT SURE [ ]

Question 3. In your opinion, do you think that the Malaysian mass media such as TV, Radio, and Newspapers have played effective roles towards the protection and conservation of the natural environment?

YES [ ] NO [ ] NOT SURE [ ]

Question 4. This questionnaire is designed to assess some of **your general feelings** about the **environmental problems and possible solutions** to those problems. Please indicate the amount of agreement or disagreement that you might have with each statement.

1 = **strongly disagree** with the statement (SD)
2 = **disagree** with the statement (D)
3 = **neutral**, neither agree nor disagree with the statement (N)
4 = **agree** with the statement (A)
5 = **strongly agree** with the statement (SA)

	Statements	**Amount of Agreement orDisagreement**				
		SD	**D**	**N**	**A**	**SA**
A.	Recycling my cans, glass, and paper will help the solid waste problems.	1	2	3	4	5
B.	Whether I live an environmentally sound lifestyle or not has no impact on whether or not others do.	1	2	3	4	5
C.	Sometimes I cannot control how much my actions contribute to environmental problems.	1	2	3	4	5
D.	By understanding the forces that cause pollution, I can help solve the problems.	1	2	3	4	5
E.	My voice can influence government to help solve many environmental problems.	1	2	3	4	5
F.	As one over 4 billion humans on the planet, my lifestyle has no real effect on the environment.	1	2	3	4	5
G.	The amount of solid waste I produce is so small compared to the total that it does not matter.	1	2	3	4	5
H.	Many problems, such as air pollution, require too much money to solve for me to have any impact.	1	2	3	4	5
I.	If I reduce the amount of solid waste I produce, it will make a difference in the solid waste problem.	1	2	3	4	5
J.	I can influence the forces that cause pollution.	1	2	3	4	5
K.	If I know that some behavior is wasteful, I can usually control it.	1	2	3	4	5
L.	Many environmental problems require too much power to solve for me to have any impact.	1	2	3	4	5
M.	Recycling my cans, glass, and paper is significant in the total environmental picture.	1	2	3	4	5
N.	Since there is really no such thing as luck, most environmental problems will be solved by the efforts of concerned people.	1	2	3	4	5

	Statements	SD	D	N	A	SA
		Amount of Agreement orDisagreement				
O.	Many environmental problems have too many unpredictable elements for effective solutions to be found.	1	2	3	4	5
P.	By understanding the forces that cause pollution, I can help solve the problems.	1	2	3	4	5

Question 5. This questionnaire is designed to determine how important natural resources are to you. The condition of our natural resources can sometimes affect your lifestyle, health, and so on. Keeping this in your mind, please rate the following natural resources conditions (A to L) in terms of their **importance to you**. In other words, how much do you feel the following conditions of our natural resources might affect you?

1 = the condition is **not important** to me **(NI).**
2 = the condition is **somewhat important** to me **(SI).**
3 = the condition is **moderately important** to me **(MI).**
4 = the condition is **important** to me **(I).**
5 = the condition is **very important** to me **(VI).**

	Conditions	NI	*SI*	*MI*	*I*	VI
		Importance				
A.	The destruction of Malaysia's tropical rain forest.	1	2	3	4	5
B.	Acid rain caused by burning fossil fuels.	1	2	3	4	5
C.	The pollution of streams and rivers.	1	2	3	4	5
D.	The loss of prime agricultural lands.	1	2	3	4	5
E.	The loss of wildlife habitat.	1	2	3	4	5
F.	The possible extinction of a number of plant species.	1	2	3	4	5
G.	The possible extinction of a number of animal species.	1	2	3	4	5
H.	The disposal of large quantities of solid wastes in natural areas.	1	2	3	4	5
I.	The disposal of toxic wastes in natural areas.	1	2	3	4	5
J.	The contamination of groundwater.	1	2	3	4	5

Question 6. Many reasons have been proposed for valuing natural areas. Please tell me how important each of he following reasons is to you with regards to the natural areas around you.

	Not Important	Somewhat Important	Moderately Important	Important	Very Important
A. Provide recreation opportunities.	1	2	3	4	5
B. Protect wildlife habitat.	1	2	3	4	5
C. Protect water quality.	1	2	3	4	5
D. Protect air quality.	1	2	3	4	5
E. Provide opportunities for quality family experience.	1	2	3	4	5
F. Conserve natural areas for scientific research works.	1	2	3	4	5
G. An important resource for future generations to enjoy	1	2	3	4	5
H. Provide income for tourism industry.	1	2	3	4	5
I. Preserve natural ecosystems.	1	2	3	4	5
J. Provide income from logging and mining.	1	2	3	4	5
K. Provide opportunities for us to enjoy the aesthetics.	1	2	3	4	5
L Just knowing that it's there if I wanted to enjoy it in the future.	1	2	3	4	5

Question 7. Please rate the following statements (A to L) in terms of their importance **related to your *"quality of life"* principles.**

	Statements	Not Important	Somewhat Important	Moderately Important	Important	Very Important
A.	Air quality.	1	2	3	4	5
B.	Time to spend with family.	1	2	3	4	5
C.	Clean rivers.	1	2	3	4	5
D.	Education for children.	1	2	3	4	5
E.	Transportation needs	1	2	3	4	5
F.	Religion	1	2	3	4	5
G.	Natural environment	1	2	3	4	5
H.	Money.	1	2	3	4	5
I.	Recycling practices.	1	2	3	4	5
J.	Modern home appliances.	1	2	3	4	5
K.	Wildlife.	1	2	3	4	5
L.	Wealth / being wealthy	1	2	3	4	5

Question 8. Please **select just one statement** from the list above (Question 7, statements A through L) that you feel would be the most important "quality of life" element for you.

Write the Statement #: _____?

Background Information.

Question 9. Age: _______ years.

Question 10. Gender: MALE [ ] / FEMALE [ ]

Question 11. Select the highest level of education you have attained.

A. None
B. Primary Education
C. Secondary Education (SRP)
D. Secondary Education (SPM)
E. Secondary Education (STPM)
F. Diploma (Associate's Degree)
G. Bachelors Degree
H. Graduate Degree

Question 12. Which of the following types of areas best describes the place where you lived when you were growing up?

A. Rural Village
B. Small town (Pekan)
C. Large town (Bandar)
D. City

Question 13. Please select your monthly income category.

A. Less than RM 500.00
B. RM 501.00 – RM 1,000.00
C. RM 1,001.00 – RM 2,000.00
D. RM 2.001.00 – RM 3,000.00
E. Greater than RM 3,000.00

Thank You

Appendix B
Survey Instrument with Frequencies and Means Included

This study was designed to understand people's attitude towards environmental conservation issues in Malaysia. Your participation in this study is voluntary. There are no known risks to taking this survey, however, if you feel uncomfortable with any questions, you may skip them. The survey should take about 15 to 20 minutes to complete. The survey is completely anonymous and all reported results would be in aggregate form. Your opinion is very important to the success of this study.

Thank you for your help.
We really do appreciate your participation.

"In this survey, the words "natural areas" and natural environment will be used interchangeably. For the purpose of this study "natural areas" and "natural environment" are defined as all types of, rivers, lakes, mangroves, mountains, hills, beaches, islands and forested land."

For each question, please circle just one answer that best reflect your response to it. Remember there are no right or wrong answers; just respond to the questions sincerely.

Question 1.

Lately there have been many issues raised regarding the pollution of our rivers.

A. Are you aware of this problem? YES [90.2 %] / NO [9.8 %]

The public, which includes you and I, is said to be one of the major contributors to this problem. We have been discarding all kinds of waste materials into our drain system. Now, lets assume that the government has come up with a new waste disposal strategy, which if adopted by the public could alleviate some of the river pollution problems in the future. This new strategy is just a recommendation by the government and is not required by the law. Therefore, it's up to you if you want to practice this new domestic waste disposal strategy or not. There is **no right** or **wrong answer** for this question. So, please answer based on how you feel about making changes to your existing practice of waste disposal voluntarily, taking into account that this change might cost you bit more, but at the same time it helps keep the rivers cleaner.

B. Please be sincere when choosing the statement that best describes how you would react to this new waste disposal method?

E. I will probably be the first one to try this new method, since it helps clean our rivers. **12.9 %**
F. I will probably try out this new method after I study the details and be a role model to provide information to others. **18.7 %**
G. I will try out this new method if most of the people around me have already adopted this new method. **54.4 %**
H. I will most likely not change the way I dispose off my domestic waste now, unless, it's required by the law. **14.0%**

Question 2. In your opinion, do you think that the Malaysian Government has taken appropriate actions to help protect and conserve the natural environment?

YES [17.6 % **]** **NO [** 39.5 % **]** **NOT SURE [** 42.9 % **]**

Question 3. In your opinion, do you think that the Malaysian mass media such as TV, Radio, and Newspapers have played effective roles towards the protection and conservation of the natural environment?

YES [18.2 % **]** **NO [** 38.7 % **]** **NOT SURE [** 43.1 % **]**

Question 4. This questionnaire is designed to assess some of **your general feelings** about the **environmental problems and possible solutions** to those problems. Please indicate the amount of agreement or disagreement that you might have with each statement.

1 = **strongly disagree** with the statement (SD)
2 = **disagree** with the statement (D)
3 = **neutral**, neither agree nor disagree with the statement (N)
4 = **agree** with the statement (A)
5 = **strongly agree** with the statement (SA)

	Statements	**Amount of Agreement orDisagreement**				
		SD	**D**	**N**	**A**	**SA**
A.	Recycling my cans, glass, and paper will help the solid waste problems. [M = 3.10]	12.9	3.1	53.1	23.1	7.8
B.	Whether I live an environmentally sound lifestyle or not has no impact on whether or not others do. [M = 3.37]	12.4	4.4	25.5	49.8	8.0
C.	Sometimes I cannot control how much my actions contribute to environmental problems. . [M = 3.38]	11.1	5.1	27.5	47.8	8.5
D.	By understanding the forces that cause pollution, I can help solve the problems. . [M = 3.14]	12.2	2.5	53.1	23.3	8.9
E.	My voice can influence government to help solve many environmental problems. . [M = 3.24]	5.8	7.8	52.0	24.9	9.5
F.	As one over 4 billion humans on the planet, my lifestyle has no real effect on the environment. . [M = 3.35]	10.7	6.2	28.9	45.6	8.5
G.	The amount of solid waste I produce is so small compared to the total that it does not matter. . [M = 3.36]	12.5	4.2	26.2	48.5	8.5
H.	Many problems, such as air pollution, require too much money to solve for me to have any impact. . [M = 3.38]	11.5	4.2	28.0	47.6	8.7
I.	If I reduce the amount of solid waste I produce, it will make a difference in the solid waste problem. . [M = 3.12]	9.1	7.3	55.8	18.4	9.5
J.	I can influence the forces that cause pollution. . [M = 3.26]	8.9	4.7	46.7	30.9	8.7
K.	If I know that some behavior is wasteful, I can usually control it. . [M = 3.12]	9.3	7.3	55.5	18.0	10.0
L.	Many environmental problems require too much power to solve for me to have any impact. . [M = 3.37]	11.1	4.9	28.7	46.0	9.3
M.	Recycling my cans, glass, and paper is significant in the total environmental picture. . [M = 3.20]	9.8	4.7	50.5	25.5	9.5
N.	Since there is really no such thing as luck, most environmental problems will be solved by the efforts of concerned people. . [M = 3.25]	9.3	5.5	45.5	30.9	8.9

	Statements	SD	D	N	A	SA
		Amount of Agreement or Disagreement				
O.	Many environmental problems have too many unpredictable elements for effective solutions to be found. . [M = 3.32]	12.9	4.4	29.8	43.6	9.3
P.	By understanding the forces that cause pollution. I can help solve the problems. . [M = 3.25]	9.6	4.7	45.8	30.7	9.1

Question 5. This questionnaire is designed to determine how important natural resources are to you. The condition of our natural resources can sometimes affect your lifestyle, health, and so on. Keeping this in your mind, please rate the following natural resources conditions (A to L) in terms of their **importance to you**. In other words, how much do you feel the following conditions of our natural resources might affect you?

1 = the condition is **not important** to me **(NI).**
2 = the condition is **somewhat important** to me **(SI).**
3 = the condition is **moderately important** to me **(MI).**
4 = the condition is **important** to me **(I).**
5 = the condition is **very important** to me **(VI).**

	Conditions	NI	*SI*	*MI*	*I*	VI
		Importance				
A.	The destruction of Malaysia's tropical rain forest. [M = 2.84]	11.1	20.4	44.2	21.8	2.5
B.	Acid rain caused by burning fossil fuels. . [M = 2.20]	22.7	41.1	30.4	4.4	1.5
C.	The pollution of streams and rivers. . [M = 3.73]	0.9	7.6	29.5	41.6	20.4
D.	The loss of prime agricultural lands. . [M = 2.09]	21.1	50.7	26.7	1.5	0.0
E.	The loss of wildlife habitat. . [M = 2.84]	10.4	21.5	44.5	21.3	2.4
F.	The possible extinction of a number of plant species. . [M = 2.85]	6.2	25.8	48.0	17.1	2.9
G.	The possible extinction of a number of animal species. . [M = 3.39]	3.6	8.5	38.4	44.2	5.3
H.	The disposal of large quantities of solid wastes in natural areas. . [M = 2.38]	28.4	28.2	22.9	18.2	2.4
I.	The disposal of toxic wastes in natural areas. . [M = 2.33]	28.7	30.4	21.3	18.2	1.5
J.	The contamination of groundwater. . [M = 3.89]	0.2	4.9	26.7	42.4	25.8

Question 6. Many reasons have been proposed for valuing natural areas. Please tell me how important each of he following reasons is to you with regards to the natural areas around you.

	Not Important	Somewhat Important	Moderately Important	Important	Very Important
A. Provide recreation opportunities. . [M = 2.82]	6.9	24.9	50.0	15.8	2.4
B. Protect wildlife habitat. . [M = 2.37]	12.0	46.4	34.0	7.6	0.0
C. Protect water quality. . [M = 3.94]	0.0	5.5	24.2	40.9	29.5
D. Protect air quality. . [M = 2.95]	0.0	28.4	51.5	16.7	3.5
E. Provide opportunities for quality family experience. . [M = 2.26]	16.4	39.6	36.9	6.2	0.9
F. Conserve natural areas for scientific research works. . [M = 2.91]	2.7	33.6	38.2	20.9	4.5
G. An important resource for future generations to enjoy . [M = 2.64]	13.5	31.5	36.2	15.8	3.1
H. Provide income for tourism industry. . [M = 4.23]	0.5	1.1	5.6	60.2	32.5
I. Preserve natural ecosystems. . [M = 2.59]	14.0	41.3	23.1	14.7	6.9
J. Provide income from logging and mining. . [M = 3.58]	1.3	3.3	37.5	52.2	5.8
K. Provide opportunities for us to enjoy the aesthetics. . [M = 2.40]	18.0	35.3	36.5	8.7	1.5
L Just knowing that it's there if I wanted to enjoy it in the future. . [M = 2.88]	11.3	26.2	32.4	23.8	6.4

Question 7. Please rate the following statements (A to L) in terms of their importance **related to your *"quality of life"* principles.**

	Statements	Not Important	Somewhat Important	Moderately Important	Important	Very Important
A.	Air quality. . [$\boxed{M = 3.58}$]	1.5	7.6	38.2	37.3	15.5
B.	Time to spend with family. . [$\boxed{M = 3.96}$]	0.0	0.5	25.5	51.8	22.2
C.	Clean rivers. [$\boxed{M = 3.75}$]	0.5	3.6	38.2	35.3	22.4
D.	Education for children. . [$\boxed{M = 4.52}$]	0.0	0.0	0.0	48.2	51.8
E.	Transportation needs . [$\boxed{M = 3.89}$]	0.5	1.6	23.1	57.6	17.1
F.	Religion . [$\boxed{M = 4.54}$]	0.0	0.0	2.5	40.9	56.5
G.	Natural environment . [$\boxed{M = 3.15}$]	1.1	14.0	58.7	21.6	4.5
H.	Money. . [$\boxed{M = 4.54}$]	0.0	0.0	2.2	42.0	55.8
I.	Recycling practices. . [$\boxed{M = 2.70}$]	9.8	30.9	41.5	14.7	3.1
J.	Modern home appliances. . [$\boxed{M = 2.68}$]	8.2	36.0	39.3	12.7	3.6
K.	Wildlife. . [$\boxed{M = 2.57}$]	5.5	46.0	36.7	10.2	1.6
L.	Wealth / being wealthy . [$\boxed{M = 2.94}$]	5.8	18.2	53.3	22.0	0.7

Question 8. Please **select just one statement** from the list above (Question 7, statements A through L) that you feel would be the most important "quality of life" element for you.

Write the Statement #: ____? **Religion = 51.6 % ; family time =32.9 % ; money = 10%**
Wealth = 2.9 %

Background Information.

Question 9. Age: _______ years. [$\boxed{\textbf{mean = 33 years}}$]

Question 10. Gender: MALE [$\boxed{\textbf{52.2 \%}}$] / FEMALE [$\boxed{\textbf{47.8 \%}}$]

Question 11. Select the highest level of education you have attained.

I.	None	
J.	Primary Education	**2.2 %**
K.	Secondary Education (SRP)	**8.7 %**
L.	Secondary Education (SPM)	**18.4%**
M.	Secondary Education (STPM)	**16.7%**
N.	Diploma (Associate's Degree)	**34.9%**
O.	Bachelors Degree	**17.6%**
P.	Graduate Degree	**1.5 %**

Question 12. Which of the following types of areas best describes the place where you lived when you were growing up?

E.	Rural Village	**14.5 %**
F.	Small town (Pekan)	**40.0 %**
G.	Large town (Bandar)	**38.5 %**
H.	City	**6.9 %**

Question 13. Please select your monthly income category.

F.	Less than RM 500.00	**0.0 %**
G.	RM 501.00 – RM 1,000.00	**14.0 %**
H.	RM 1,001.00 – RM 2,000.00	**42.4 %**
I.	RM 2.001.00 – RM 3,000.00	**32.9 %**
J.	Greater than RM 3,000.00	**10.7 %**

Thank You