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EXPLAINING RECREATIONIST RESPONSIBLE BEHAVIOUR: A CASE OF SCUBA DIVING

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**THESIS SUBMITTED IN FULFILLMENT
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ABSTRACT

The booming diving tourism has spurred increasing concern about the detrimental impact potentially caused by SCUBA divers on the fragile marine ecosystem. Though many impact studies on divers' underwater behaviours have been investigated, the comprehension of the antecedents that influence divers' underwater responsible behaviour, from the socio-psychological perspective, have remained vague and lack a thorough theoretical foundation. Despite the recommendations of pro-environmental researchers on utilizing the combinations of variables from different theories to develop new research models, there is a paucity of empirical research to validate this theoretical application, specifically in the outdoor recreation setting. The present study aims to address this gap by examining the causality and testing a theoretical model of specific responsible environmental behaviour (underwater behaviour) among SCUBA divers, using selected personal socio-psychological factors and normative factors as antecedents of environmental behaviour.

An exploratory model of SCUBA divers' underwater responsible behaviour was developed using key antecedents identified from existing literature. Four hundred and thirteen responses were collected from SCUBA divers visiting the five most popular SCUBA diving islands in Malaysia. Structural Equation Modelling (SEM) approach was used to analyse the survey responses. The structural model showed good fit to the data as well as appropriate nomological and convergent validity and stable reliability.

The findings of the present study revealed the importance of four prominent antecedents i.e..experience level, diving attitude, personality and personal norms in explaining

divers' responsible underwater behaviour. Diving attitude was found to consist of three dimensions: commitment, knowledge of dive practice, and knowledge of regulations. The findings also indicated that diving attitude has a mediating role in the relationship between experience level, personality and divers' underwater behaviour. Additionally, personal norms display a mediating role in the relationship between subjective norms and divers' underwater behaviour.

A pertinent contribution of the current study is the introduction of a robust Model of Divers' Underwater Responsible Behaviour, developed from an integrated framework from two behavioural theories, which contributed towards better understanding of underwater responsible behaviour among SCUBA divers. Theoretically, this study contributes to the body of knowledge as it provides validated exploratory dimensions that constitute the measurement constructs for responsible underwater behaviour as well as SCUBA diving attitudes. In the aspect of managerial implication, the identification of prominent antecedents which are related to behaviour of divers underwater together with the strength of the influences, allows all scuba diving industry's stakeholders to plan, design and implement appropriate measures to mitigate the impacts of the activity on the marine environment.

ABSTRAK

Industri pelancungan selam SCUBA yang kian pesat berkembang telah membangkitkan kebimbangan kesan mudarat yang diakibatkan oleh penyelam SCUBA terhadap sistem ecologi akuatik. Walaupun banyak kajian impak berkaitan tingkahlaku penyelam telah dilaksanakan, pemahaman tentang latar belakang dan faktor-faktor yang mempengaruhi tingkahlaku penyelam-penyelam SCUBA dalam air masih kabur. Kajian-kajian dalam aspek ini didapati masih kekurangan sokongan asas teori yang kukuh. Kebelakangan ini, penyelidik-penyelidik dalam bidang kajian tingkahlaku pro-persekitaran telah mengemukakan cadangan penggunaan gabungan teori-teori yang berbeza untuk membentuk model penyelidikan baru. Namun demikian, didapati masih wujud kekurangan penyelidikan empirikal untuk meneliti dan mengesahkan aplikasi konsep gabungan teori ini dalam kajian bidang rekreasi luar. Justeru itu, kajian ini bertujuan untuk merapatkan jurang pengetahuan ini melalui penelitian sebab-musabab serta menguji satu model tingkahlaku pro-persekitaran yang khusus (iaitu Tingkahlaku Bertanggungjawab Dalam Air) di kalangan penyelam SCUBA. Dalam pada itu, beberapa faktor sosio-psikologi dan sosio-norma telah dikenalpasti dan digunakan untuk menerangkan latar belakang kelakuan pro-persekitaran yang bertanggungjawab di kalangan penyelam SCUBA.

Selaras dengan tujuan kajian, satu model 'Tingkahlaku Bertanggungjawab Dalam Air' telah dibentuk berasaskan faktor-faktor yang dikenal pasti dari kajian–kajian lampau yang sedia ada. Data kajian telah dikumpul dari empat ratus tiga belas (413) orang penyelam SCUBA yang telah mengunjung ke lima pulau selam SCUBA yang paling popular di Malaysia. Pendekatan 'Structural Equation Modelling' (SEM) telah digunakan untuk menganalisis data yang dikumpulkan. Model struktur yang dibentuk

menunjukkan kesesuaian dengan data yang diperolehi. Disamping itu, model ini juga mencerminkan validiti yang tertumpu dan mempunyai reliabiliti yang stabil.

Hasil kajian ini menunjukkan kepentingan empat faktor latar belakang, iaitu Tahap Pengalaman, Personaliti, Sikap Menyelam dan Norma-Norma Peribadi dalam menjelaskan Tingkahlaku Bertanggungjawab Dalam Air di kalangan penyelam SCUBA. Sikap Menyelam didapati terdiri daripada tiga dimensi: komitmen, pengetahuan tentang amalan menyelam, dan pengetahuan tentang peraturan-peraturan. Hasil kajian ini juga menunjukkan bahawa Sikap Menyelam memainkan peranan sebagai pengantaraan (mediator) bagi hubungan antara Tahap Pengalaman, Personaliti, dan Tingkahlaku Bertanggungjawab Dalam Air bagi penyelam SCUBA. Selain itu, norma-norma peribadi memaparkan peranan pengantaraan dalam hubungan antara norma-norma subjektif dan Tingkahlaku Bertanggungjawab Dalam Air bagi penyelam SCUBA.

Salah satu sumbangan utama kajian ini adalah memperkenalkan satu Model yang mantap iaitu ‘Model Tingkahlaku Bertanggungjawab Dalam Air’, di mana ia telah direkabentuk melalui integrasi antara dua teori tingkah laku. Gabungan teori-teori ini telah menyumbang ke arah memberi gambaran dan penjelasan yang lebih lanjut mengenai pemahaman kelakauan bertanggungjawab di kalangan penyelam SCUBA semasa dalam air. Dari aspek teori, kajian ini menyumbang kepada badan ilmu pengetahuan kerana ia berjaya meneroka dan mengesahkan dimensi-dimensi yang terlibat dalam pengukuran Sikap Menyelam dan Tingkahlaku Bertanggungjawab Dalam Air bagi penyelam SCUBA. Dalam aspek implikasi pengurusan, pengenalpastian faktor-faktor utama yang mempegaruhi tingkahlaku penyelam SCUBA membolehkan semua pihak yang terlibat dalam industri selam SCUBA untuk

merancang, merekabentuk dan melaksanakan langkah-langkah yang sesuai bagi mengurangkan aktiviti yang membawa impak negatif kepada persekitaran akuatik.

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER 1: INTRODUCTION

1.0 Introduction

SCUBA (Self-Contained Underwater Breathing Apparatus) diving which started as a sport or a recreational activity is now developing into a booming sector of travel industry worldwide. For the past two decades, there have been a huge increase in the number of certified divers worldwide. According to the Professional Association of Dive Instructors (PADI), globally the number of certified divers in 2008 is 17.8 million, compared with 2.5 million in 1988 (PADI Statistics, 2011). This increasing trend together with the growing demand for new diving destinations have stimulated the rapid development of SCUBA diving tourism in a relatively short period of time. Among factors which contribute to the popularity of recreational SCUBA diving are the development of safer and affordable diving equipment (Davis & Tisdell, 1995), the advances in technology that produce marine craft which enable easy access to remote coral reef areas (Parker, 2001) and the rising interest in nature (Harriott *et al.*, 1997).

The booming diving tourism is now causing severe pressure on the fragile ecosystems (Carter, 1990; Fishelson, 1995; Harriott *et al.*, 1997; Hawkins & Roberts, 1992; Neil, 1990; Rinkevich, 1995). Divers' impact on the coral reef has been widely documented in many different parts of the world (Dixon, 1993; Hawkins & Roberts, 1992; Riegl, 1991). In the Northern Red Sea, Riegl and Velimirov (1991) found significant coral breakages and higher rate of tissue loss occurred in areas frequently visited by divers. Similarly, Hawkins and Roberts (1992) discovered a significant increase in coral colonies damage occurred in heavily visited dive sites in Egypt. Diving activities also affect the biological diversity of coral communities in the Caribbean Island of Bonaire (Dixon, 1993).

Malaysia is situated in the region of South East Asia and in a part of the world's oceans area known as the 'Coral Triangle', which scientists recognize as the ocean area with the highest marine biodiversity (Reef Check Malaysia, 2010). Although this maritime environment of South East Asia occupies only 2.5% of the global ocean, it contains nearly 34% of the world's coral reefs (Burke, 2002). With its 4,800 km of coastline, Malaysia has about 3,600 km² of reef around the country, including fringing reefs and offshore islands. It harbours a very rich bio-diverse marine ecosystem, with over 350 species of the almost 800 reef building coral species found on earth (Reef Check Malaysia, 2010). However, the diverse coral reef systems that are found in the country are experiencing the greatest threat from human activities. It is estimated that 42% of Malaysia's coral reef are facing high levels of risk of damage from human activities which include coastal development, sedimentation, marine-based pollution, over fishing and destructive fishing (Wild Asia, 2008). In addition, the increasing popularity of SCUBA diving activity and visitor numbers to the reefs are also causing significant physical damage to the reefs (Barker & Roberts, 2004).

Coral reefs are very fragile, and physical contact of divers may cause death of the coral. Damage to coral by recreational divers is usually through direct physical contact (intentional or accidental) with their hands, body, equipment, and fins (Talge, 1992). While impacts from individual divers may be minor, the cumulative impacts of divers may be substantial. Several studies have indicated that a large proportion (70–90%) of divers contact the reef during their dives (Harriott *et al.*, 1997; Rouphael & Inglis, 2001; Talge, 1992). As behaviour of divers is a pertinent factor to the state of marine environment, a closer examination on divers' behaviour and its antecedents is essential. The damage to the marine environment could jeopardize the future sustainability of the SCUBA diving industry. Much of the damage is preventable by changing the behaviour

of divers underwater. Therefore, with a view to minimizing the impacts of divers' activity on marine environment, a thorough understanding of the causes that might influence underwater behaviour is crucial.

1.1 Background of study

Generally, research on understanding pro-environmental behaviour consists of two major streams (Dietz *et al.*, 1998), namely socio-demographic and socio-psychological streams. In respect of the socio-demographic stream, education and age have consistently shown effects on pro-environmental behaviours compared to other variables (Dietz *et al.*, 1998; Jones & Dunlap, 1992; Van Liere & Dunlap, 1980). Comparatively, in the socio-psychological stream, the constructs of values, attitudes, and beliefs have shown better results in predicting pro-environmental behaviours (Boldero, 1995). The studies were conducted based on the premise that individuals' behaviour toward the environment has some relationship with what they think and feel with respect to the environment and with respect to pro-environmental actions (Guagnano *et al.*, 1995; Heberlein & Black, 1976; Taylor & Todd, 1995).

In relation to this, studies often employ the Theory of Reasoned Action (TRA) (Ajzen, 1991) and Theory of Planned Behaviour (TPB) (Ajzen, 1985; Ajzen, 1991) in understanding the various socio-psychological variables that are linked to certain pro-environmental behaviours. Another theory that is frequently applied to describe and explain pro-environmental behaviour is the Norm Activation Theory (NAT) (Schwartz, 1973). Several studies have provided empirical evidence that NAT contributes to the explanation of pro-environmental behaviours such as energy conservation (Black *et al.*, 1985), recycling (Guagnano *et al.*, 1995) and green consumerism (Thøgersen & Ölander, 2006). In addition, Stern, Dietz and Guagnano (1995) have emphasized that attitude-

behaviour theories have been proven useful in predicting certain specific pro-environmental behaviours. According to Stern (2000), recent research concerning pro-environmental behaviour often combines variables from different theories into new models. Stern (2000) proposed that theories are not immutable and a coherent theory could be developed via addition of new constructs on earlier work. Among examples of pro-environmental behaviour studies are travel mode choice (Hunecke *et al.*, 2001) , car usage (Bamberg & Schmidt, 2003), environmental conservation (Saunders, 2003) and recycling (Oom Do Valle *et al.*, 2005).

In the attempt to further explain the influences on pro-environmental behaviour, Stern (2000) has proposed four types of causal variables, which include personal capabilities, attitudinal factors, habit or routine, and external or contextual factors. The personal capabilities consist of the individual's knowledge, skill, available time and money, social status, and power. Attitudinal factors comprised of environmental and non-environmental attitudes, beliefs, values, and personal norms. Habit or routine represents the tendency to act without thoroughly considering the behavioural choice. Stern (2000) pointed out that attitudinal factors and habit or routine may be classified as psychological factors. Lastly, the external or contextual factors comprise physical, social, economic, and political variables. However, the importance of psychological factors over and above socio-demographic and contextual factors have been demonstrated in the context of pro-environmental travel behaviour (Hunecke *et al.*, 2001; Steg *et al.*, 2001).

A review of previous researches revealed that many researchers have tried to examine the simple relationships that are believed to exist among a limited number of environmental behaviour-related variables (Schwartz, 1968; Sia *et al.*, 1986; Smith-

Sebasto, 1995). Among the indicators related to the creation of responsible environmental behaviour are attitude, locus of control (LOC), knowledge, responsibility, social norm, sensitivity, and intention to act (Hines *et al.*, 1987; Hungerford & Volk, 1990; Sia *et al.*, 1986). It was suggested that changing these affective and cognitive factors to be more environmentally favourable will result in more responsible environmental behaviours. Recent literature also indicates that the predictors of general environmental behaviour have documented some degree of relationship between attitude, subjective norms, perceived behavioural control and environmental concern (Armitage & Conner, 2001; Oom Do Valle *et al.*, 2005). It can be clearly seen that attitude is recognised as one of the prominent variables that influence behaviour.

In most studies involving behavioural theories in explaining environmental behaviour formation, attitude is recognised as one of the most important influences on behaviour (Newhouse, 1990). Attitude is defined as a psychological state that predisposes a person to act favourably or unfavourably to an event or situation (Eagly & Chaiken, 1993, p. 1). Thus, environmental attitude describes an individual's favourable or unfavourable feelings with regard to particular aspects of the environment (Hines *et al.*, 1987; Newhouse, 1990). Hines and others (1987) outlined two types of attitudes that have been examined by researchers. These are: (1) attitudes towards the environment, and (2) attitudes towards ecological behaviour. Azjen and Fishbein (1980) have explained that attitude comprises general attitudes toward objects, and more specific attitudes toward certain issues. Attitude towards the environment is also commonly referred to as environmental concern (Vining & Ebreo, 1992). With reference to the literature, the current study considers environmental concern as representing general environmental attitude, and specific attitude is represented by diving attitude.

In addition, several researchers have indicated that environmental studies should continue to explore other significant predictors of responsible environmental behaviour (Schwartz & Howard, 1981; Hwang *et al.*, 2000; Thapa *et al.*, 2005). Relating to this, Hwang, Kim and Jeng (2000) have proposed that there are strong possibilities of changing the relationships among environmental behaviour-related variables by introducing new variables in the model. Evidence of psychology literature showed that people's personalities greatly influence their behaviour (Furnham, 1990; Phares, 1991). Personality, as a multifaceted concept, has been shown to positively influence environmental behaviour, in various consumer behaviour studies (Balderjahn, 1988; Fraj & Martinez, 2003; Ramanaiah *et al.*, 2000). Specifically, Swami *et al.* (2010) found that higher personality traits of 'conscientiousness' are associated with better pro-environmental waste management behaviour. Literature examining the relationship between underwater responsible behaviour and personality traits among SCUBA divers is almost non-existent with the exception of Musa and others' (2011) study.

However, Musa *et al.*'s (2011) study has several limitations. The use of convenience sampling (snowballing) and the sampling which was not on-site may have rendered the information on SCUBA diving behaviour as less valid. There was also the possibility that the convenience sampling may have attracted divers with certain types of personality (e.g. agreeableness). Besides, the study also used a very limited list of responsible behaviour items which resulted in only one factor-responsible underwater behaviour-derived from factor analysis.

In SCUBA diving literature, it was reported that the degree of actual impact on coral is influenced by level of experience and skill of divers (Davis & Tisdell, 1995; Harriott *et al.*, 1997). Several recent studies have also demonstrated fairly strong support for the

relationship between experience level and divers' underwater behaviour (Musa *et al.*, 2011; Thapa *et al.*, 2006; Todd, 2000). With reference to the above literature, experience has been considered as an antecedent to explain divers' underwater behaviour in the present study.

Following a review of literature, there seems to be limited research involved in identifying predictors of specific responsible environmental behaviour (SREB), such as SCUBA diving. Several theorists (Ajzen & Fishbein, 1973; Cottrell & Graefe, 1997; Heberlein & Black, 1976) have indicated that more specific-issue variables are better predictors of overt behaviour in specific-issue situations. As in Cottrell and Graefe's (1997) study on specific responsible environmental behaviour among recreation boaters, it revealed that significant predictors of the related behaviour include awareness of consequences & knowledge of specific-issues (SREB), environmental concern (as general responsible environmental behaviour variable) , years of experience, education and boat length. The findings of the study demonstrated the importance of socio-psychological variable (attitude) and personal capabilities variable (boating experience) in explaining specific responsible boating behaviour.

In relation to previous literature and studies, the present study takes into account the personal factors (experience level, personality and environmental concern) and the specific attitude construct (diving attitude) as antecedents to examine their influences on specific responsible behaviour (divers' underwater behaviour) among divers. With the aim to provide better understanding of divers underwater responsible behaviour, two additional constructs from NAT (personal norms and subjective norms) were introduced to the framework of the present research.

1.2 Problem Statement

The rapid increase in the number of certified divers worldwide has made SCUBA diving one of the world's fastest growing recreational sports, and is now a multi-billion dollars industry. Evidence of the increasing participation in SCUBA diving activity can be observed from the global statistics of certified divers over the past two decades, and is projected for further growth. The rapid development of the dive tourism industry has however spurred increasing concern about the detrimental impacts that could potentially be caused by divers in the marine environment. As noted by Barker and Roberts (2004), the increasing popularity of SCUBA diving activity has also contributed threats to the growth and reproduction of the coral reefs. To address this issue, many studies have been conducted in order to mitigate the negative impacts of divers on the reef environment.

Generally, studies on the impacts of divers on the marine environment have been examined via three approaches. These are the examination of the carrying capacity of dive sites (Davis & Tisdell, 1995; Harriott *et al.*, 1997; Rouphael & Inglis, 1997; Zakai & Chadwick-Furman, 2002), the identification of divers' demographic and behaviour characteristics that may have greater negative impacts than others divers (Barker & Roberts, 2004; Rouphael & Inglis, 2001) and the focus on the types of intervention that may alter divers' underwater behaviour (Barker & Roberts, 2004; Medio *et al.*, 1997). Although many impacts of divers' underwater behaviours have been investigated, the understanding of the antecedents that influence divers' underwater responsible behaviour is still relatively unexplored.

In the outdoor recreation setting, studies on the antecedents of responsible environmental behaviours have been limited to several variables such as environmental

attitude/awareness, locus of control (LOC), knowledge, experience, responsibility, social norm, and intention to act (Cottrell, 2003; Hines *et al.*, 1987; Hungerford & Volk, 1990; Sia *et al.*, 1986). Some researchers have indicated that environmental studies should continue to explore other significant predictors of responsible environmental behaviour (Hwang *et al.*, 2000; Marcinkowski, 1998; Thapa *et al.*, 2005; Wilke, 1990). Relating to this, Hwang *et al.* (2000) have proposed that there are strong possibilities of changing the relationships among environmental behaviour-related variables by introducing new variables in the model.

Literature in consumer behaviour studies revealed that personality has been shown to be positively related to environmental behaviour (Arbuthnot, 1977; Balderjahn, 1988; Fraj & Martinez, 2003, 2006; Ramanaiah *et al.*, 2000; Witt, 2002). Apparently, there is a paucity of empirical research specifically examining the relationship between responsible environmental behaviour, per se, and trait personality types in the outdoor recreation setting. Thus, personality is an additional variable necessary to be considered as a significant predictor of responsible environmental behaviour among divers.

Despite the fact that much research has been conducted on identifying the predictors of general responsible environmental behaviour (GREB), there is only limited research involved in identifying predictors of specific responsible environmental behaviour (SREB) in the outdoor recreation context. Herbelein and Black (1976) demonstrated that specific attitude measures concerning a given behaviour, are better predictors of that behaviour than more general measures. In addition, Heberlein and Black (1976, p.479) emphasized that "by including both, one can better predict behaviour from attitudes, yet show how the beliefs and actions are part of a larger cognitive configuration." In the present study, specific responsible environmental behaviour

(SREB) refers to divers' underwater responsible behaviour. Thus, by incorporating both specific-issue (diving attitude) and general attitudes (environmental concern) within a theoretical framework for study, the present study aims to generate further understanding of the inter-relationship between variables pertinent to the prediction of divers' underwater behaviour.

In explaining pro-environmental behaviour, Stern (2000) has advocated the combination of variables from different theories to develop a new research model. In the recent literature, it was revealed that there were some relationships between attitude, subjective norms, personal norms, perceived behavioural control and environmental concern to operate as the predictors of general environmental behaviour (Armitage & Conner, 2001; Oom Do Valle *et al.*, 2005). However, the application of Stern's coherent theory in explaining pro-environmental behaviour among recreationists is still lacking. In response to this, the current study attempts to integrate variables from TRA and NAT to further understand the responsible environmental behaviour in the specific context of SCUBA diving. The related variables from both theories comprise attitude, and the normative factors of subjective norms and personal norms.

To begin the process of addressing the gap of understanding the antecedents that influence divers' underwater responsible behaviour, the present study has included both personal 'social-psychological' factors and normative factors as pertinent variables to be investigated. The personal 'social-psychological' factors comprise experience, personality, general environmental concern, and specific diving attitude. On the other hand, subjective norms (e.g. influence of family, friends or social groups) and personal norms (e.g individual's belief) were recognised as normative factors.

In examining the causal model of pro-environmental behaviour, previous research indicated that a number of interacting variables should be considered concurrently (Cottrell, 2003; Nordlund & Garvill, 2003; Oreg & Katz-Gerro, 2006). In addition to the variables in the attitude-behaviour models (Fishbein & Ajzen, 1974), other variables such as personal characteristics, contextual factors and personal habits may also influence attitude formation and behaviour choices (Poortinga *et al.*, 2004; Stern, 2000; Tarrant & Cordell, 1997). Several researchers have highlighted that studies examining both direct and indirect relationships between the interacting variables need to be underlined. This would provide more insights to further comprehend the fundamental constructs that form the basis of environmental responsible behaviour (Johnson *et al.*, 2004; Valle *et al.*, 2005; Vaske, 2008). Thus, to facilitate better behavioural predictability, the roles of mediators need to be examined.

Referring to existing related studies, Tarrant and Green (1999) have investigated the influence of outdoor recreation participation as a mediator and moderator variable on environmental attitude-behaviour. Moreover, general environmental attitudes or concern have also been utilized as mediators (Cottrell, 2003; Cottrell & Graefe, 1997; Fulton *et al.*, 1996; Tarrant *et al.*, 1997; Van Treeck & Schuhmacher, 1999) in examining pro-environmental behaviour among recreationists. Nevertheless, there is still a lack of study on investigating the mediating role of the specific attitude variable in the formation of specific environmental behaviour. To generate a better understanding and predictor model of divers' underwater responsible behaviour, the present study investigated the mediating role of diving attitude in examining underwater behaviour among divers. In addition, the mediating role of personal norms in the formation of responsible behaviour in relation to NAT was also investigated.

A further review of literature regarding studies on environmentally responsible behaviour indicated that there still exists disagreement regarding the extent to which behaviours can be predicted from attitudes and environmental concern. Some researchers suggest that environmental behaviours and attitudes are generally parallel with one another (Kraus, 1995) , while others disagree (Cottrell, 2003; Gamba & Oskamp, 1994; Manfredo *et al.*, 1992). Another group of researchers hold the view that 'the environmental attitude-behaviour correspondence is tenuous' (Olli *et al.*, 2001, p. 182). In the outdoor recreational context, though some studies have provided empirical support for the positive relationship between outdoor recreational participation and pro-environmental attitudes and behaviours (Dunlap & Heffernan, 1975; Pinhey & Grimes, 1979; Theodori *et al.*, 1998; Van Liere & Noe, 1981), a few studies (Jackson, 1986; Thapa & Graefe, 2003) have found otherwise. While weak measurement of essential variables and other methodological issues may be recognized as the reasons for the inconsistencies, further detailed investigation is essential to provide better explanation of the issue. It was also recognised that the setback for the weak connections between environmental attitudes and behaviour often exists in the lack of specificity between attitude measures and behaviour measures (Tarrant & Cordell, 1997; Tarrant & Green, 1999). Thus, the current study attempts to address these limitations, along with the inclusion of SCUBA diving attitude as specific-issue variables, to further examine the specific behaviour of divers' underwater responsible behaviour. This would be an exploratory investigation which has not been examined by previous research.

In response to issues discussed and recommendations found in the environmental behaviour literature, the present study seeks to examine the causality and to test a theoretical model of specific responsible environmental behaviour (underwater behaviour) among SCUBA divers, using selected personal socio-psychological factors

and normative factors as predictors of environmental behaviour. The selected personal factors include personality, experience level, environmental concern, and diving attitude. Subjective norms and personal norms are regarded as normative factors. Hence, a predictive model of divers' underwater responsible behaviour is formulated, expressing interactive relationship of the relevant variables through direct and indirect paths in the model. The causal effect of the antecedents on responsible underwater behaviour of divers would be examined using the structural equation modelling technique.

1.3 Research Questions

The present study attempts to answer questions based upon previous research findings, in line with the purpose of the study. The main aim of the present study is to examine how well the selected personal factors and normative factors can predict and provide better understanding of the underwater responsible behaviour among SCUBA divers. From the major research question, the following related research questions were formulated:

1. Do personal factors, such as experience level, personality, and environmental concern have a significant influence on SCUBA divers underwater responsible behaviour?
2. Does diving attitude have a significant influence on SCUBA divers underwater responsible behaviour?
3. Does diving attitude act as mediator in the relationship between personal factors and divers' underwater responsible behaviour?
4. Do social norms have a significant influence on divers' underwater responsible behaviour?

5. Do personal norms have a significant influence on divers' underwater responsible behaviour?
6. Do personal norms act as mediator in the relationship between subjective norms and SCUBA divers' underwater responsible behaviour?
7. To what extent does the proposed model for divers' underwater responsible behaviour fit with the data collected?

1.4 Research Objectives

In order to accomplish the major purpose of the study, several relevant objectives were formulated as follows:

1. With the purpose to confirm the relevance and benefits of using socio-psychological variables in explaining environmental responsible behaviours, the current study seeks to examine the influence of selected personal factors (i.e. personality, experience level, and environmental concern) on SCUBA divers' underwater responsible behaviour.

2. To address the issue of lack of specificity between attitude measures and behaviour measures, the study aims to explore the relationship of diving attitude (specific attitude measures) on responsible underwater behaviour (specific environmental behaviour) among SCUBA divers.

3. Since attitude measures specific to a given behaviour are recognised as better predictors of specific responsible environmental behaviour, the present study attempts to investigate the mediating role of diving attitude in the relationship between personal factors and SCUBA divers underwater responsible behaviour.

4. As subjective norms are considered pertinent variables for both TRA and NAT attitude-behaviour theory in explaining responsible environmental behaviour, the study seeks to further examine the influence of subjective norms on SCUBA divers underwater responsible behaviour.

5. In view of the fact that personal norms are a significant variable for NAT theory in explaining responsible environmental behaviour, the study attempts to examine the influence of personal norms on SCUBA divers underwater responsible behaviour.

6. In order to ascertain the function of personal norms as a mediator in NAT theory, this study then seeks to further examine the mediating role of personal norms in the relationship between subjective norms and SCUBA divers underwater responsible behaviour.

7. Taking into consideration of the relevance of all the selected variables, the study attempts to validate the fit of the proposed diver's underwater responsible model utilizing the collected data.

1.5 Significance of Study

The significance of the present study is as follows:

1. Theoretical contribution in assessing the applicability of combined attitude-behaviour theory in outdoor recreation context

The application of coherent theory (Stern, 2000) has been documented in several pro-environmental behaviour studies, which includes car usage (Bamberg & Schmidt, 2003), travel mode choice (Hunecke *et al.*, 2001; Wall *et al.*, 2007), environmental conservation (Saunders, 2003) and recycling (Oom Do Valle, *et al.*, 2005). However, the applicability of coherent theory in the examination of environmental responsible behaviour among outdoor recreationists has yet to be examined and verified. Behavioural theories such as TRA and NAT are commonly used independently to examine environmental responsible behaviour. The present study assessed the applicability of coherent theory by combining these two behavioural theories (TRA and NAT) to develop a new research model in explaining environmental responsible behaviour, which has not been attempted in previous outdoor recreation studies. This would involve the combination of variables from the two theories and provide new insights in explaining SCUBA divers' underwater responsible behaviour.

2. Contribute to the cumulative body of knowledge in outdoor recreationist environmental behaviour study

The current study employs a holistic approach to explore the dimensions of specific environmental attitude (diving attitude) which encompasses cognitive, affective and conative (behavioural) components. Diving attitude has never been examined by previous researchers in relation to SCUBA divers. Consequently, the study would present a new instrument for SCUBA diving attitude measures. In addition, divers' underwater behaviour measures would also be explored. With the constructed measurements for specific diving attitude and specific divers underwater responsible behaviour, the study would be able to clarify the issues of weak relationship caused by the lack of specificity between attitude measures and behaviour measures. The measurement instruments could also provide assistance and guidance for future

research in environmental behaviour studies among outdoor recreationists, specifically SCUBA diving activity.

In terms of methodological contribution, the present study proposed the SCUBA diving underwater behaviour model from the socio-psychological perspective using structural equation modelling (SEM), which is lacking in outdoor recreation studies. This would present an innovative approach in presenting environmental behaviour studies on outdoor recreationists.

3. Narrowing existing gaps concerning environmental behaviour in outdoor recreation research

It has been acknowledged that there still exists differences regarding the extent to which behaviours can be predicted from attitudes and environmental concern. Though some researchers advocated that environmental behaviours and attitudes are generally parallel with one another (Kraus, 1995), some others disagree (Cottrell, 2003; Gamba & Oskamp, 1994; Manfredo *et al.*, 1992). Olli *et al.* (2001, p. 182) embrace the opinion that "the environmental attitude-behaviour correspondence is tenuous". Thus, the present study attempts to address these inconsistencies with more detailed investigation on the relationship among the constructs of environmental concern, diving attitude, and divers' underwater behaviour in order to provide better explanation to the issue.

Besides addressing the attitude-behaviour relationship issue, the present study also makes an effort to provide a comprehensive insight to the mediating role of specific attitude in the relationship between environmental concern and environmental responsible behaviour. While this mediating role of specific attitude has been

recognised in some environmental behaviour studies (Ajzen & Fishbein, 1980; Bamberg, 2003), few such studies exist in the outdoor recreation setting.

4. Provide input to stakeholders in the dive industry for preservation of sustainable dive tourism

The result of the study would identify prominent antecedents that influence divers' underwater responsible behaviour. Detailed analyses of specific diving attitude dimensions could reveal the explanation towards the formation of divers' underwater responsible behaviour. The findings may help social scientists in environmental education to better understand responsible environmental behaviour among SCUBA divers, thus provides more insights for constructing appropriate and effective educational curricula or visitor communication programs to promote more sustainable use in leisure, recreation and tourism. The outcomes of the study would not only benefit academicians and research scholars, but the practitioners as well. For policy makers, the findings will provide up-to-date information on factors that tends to influence specific responsible environment behaviour among SCUBA divers. This knowledge will facilitate the relevant stakeholders to formulate plans and policies in a more strategic way to enhance positive diving attitude that leads to responsible underwater behaviour among divers. Subsequently, this would enable the development of sustainable dive tourism.

1.6 Limitations

Acknowledgement should be made that the present study was conducted under the condition of some limitations. Although the validity of the instrument has been established, there may be threats to the internal validity of the study as a function of

how the respondents filled out the questionnaire. As with any self administered questionnaire there is always the possibility that respondents may provide obligatory answers that may be seen as socially desirable. Conversely, an advantage of using self administered questionnaires is that respondents may be more likely to give accurate responses due to the anonymity of the process (Dillman & Christian, 2005).

Although detail sampling procedures were taken to gather information from a sample that was representative of the Malaysia diving population, it is imperative to note the limitations to this representativeness. The diving season for Peninsula Malaysia begins from February to October, but closed from November to January during the monsoon season. Surveys were conducted over a five months period from May to September, due to time, distance and financial constraints. In terms of the timing of the data collection, representative for divers who visit the islands for diving between February to April and the month of October is lacking.

Due to the size and scope of the dive industry, it is difficult to implement probability sampling technique for the study. However, the detailed sampling method in the selection of representative opportunities and breadth of the selection could strengthen the claim that the sample gathered is a valid representation of the Malaysian diving community. Nonetheless, care should be taken in when generalizing the data obtained beyond the Malaysian diving community.

1.7. Delimitations

The present study is subjected to several delimitations. Firstly, the geographical area of study covers five most popular diving islands in both Peninsula Malaysia and East Malaysia (state of Sabah and Sarawak). It does not include all the islands in Malaysia.

Secondly, the language used in the questionnaire was English. Thus, divers that were not proficient in the language were not represented by this sample. Thirdly, the items concerning underwater water environment and knowledge of marine parks were referring to the tropical diving environment/conditions and marine regulations in Malaysia. Hence, the study was delimited to the diving conditions in Malaysia (i.e. reef, wreck and cave diving), which exclude other diving conditions in the temperate regions (e.g. ice diving) and fresh water diving (lake, river, quarries).

1.8 Definition of Terms

The definition of terms used in the study is as follows:

Personality

Numerous definitions of personality were suggested by different personality theorists based on individual view points, personal vision and the nature of personality. The present study emphasized on the aspect of individual differences among individuals, which relates to the concept that behaviours of different individuals tend to fall at different points along various behavioural dimensions. For the purpose of this study, previous definition of personality as "a set of points falling along several behavioural dimensions, each corresponding to a trait, resulting in a unique profile, different from that of other individuals" (Pervin, 1989, p. 7) would be used. Operationally, it is represented by five types of personality traits in the Five Factor Model, which comprises extraversion, neuroticism, agreeableness, conscientiousness and openness to experience (McCrae & Costa, 1985).

Experience level

In the recreational literature, experience level is generally recognised as the sum of accumulated life experience a recreationist has within a particular recreational activity

(Virden, 1992). For the purpose of the study, experience level is referred to the accumulated experience of a diver for his involvement in SCUBA diving activity. Generally, the numbers of logged dive would reflect the accumulated dive time of a diver. A logged dive normally involve about 45 minutes of dive time. The experience level of the divers in the present study was operationalized by measuring their frequency of dives, total number of dives made and their diving certification level.

Environmental concern

Environmental concern is defined as 'the affect (i.e. worry) associated with beliefs about environmental problems' (Schultz *et al.*, 2004, p. 31). Environmental concern represents general attitudes toward ecology and the environment as a whole. In the present study, environmental concern is recognised as an expressed empathetic view of concern for the natural environment. Operationally, the New Ecological Paradigm (NEP) Scale (Dunlap *et al.*, 2000) was used to identify the three dimensions of environmental concern, which are ecocentric, dualcentric and technocentric.

Diving attitude

Generally, environmental attitude is described as 'an individual's favourable or unfavourable feelings with regard to an event / situation or particular aspects of the environment' (Hines *et al.*, 1987; Newhouse, 1990, p. 27). In the current study, diving attitude is defined as an individual's favourable or unfavourable feelings with regard to SCUBA diving in the marine environment. Thus, it represents specific attitudes toward ecology and environment actions regarding the marine environment. Operationally, diving attitude was represented by three dimensions of knowledge of dive practice, knowledge of regulation and commitment. The measurement of diving attitude was explored and developed by the researcher for the purpose of the present study.

Underwater responsible behaviour

For the purpose of the study, underwater responsible behaviour refers to specific responsible behaviour that needs to be carried out underwater in order to ensure divers' safety as well as for the protection of marine environment. Operationally, it is represented by three dimensions which consist of safety diving behaviour, skill diving behaviour and non-contact diving behaviour. These dimensions were exploratory identified for the measurement of underwater responsible behaviour.

Personal norms

Personal norms represent 'the beliefs held by the individual with regard to how he or she should behave' (Oom Do Valle *et al.*, 2005, p. 381). In the present study, personal norms are referred to as an individual's conviction or belief towards the conservation of the marine environment. Operationally, it is represented by three items regarding personal obligation to marine conservation, acting responsibly towards marine environment while diving, and participation in marine conservation activities.

Subjective norms

Subjective norm is described as a person's 'perception that most people who are important to him think he should or should not perform the behaviour in question' (Chang, 1998, p.1826). Thus, an individual tends to take into account the normative expectations of important others (e.g. family, friends or co-workers) when he/she intends to perform a certain behaviour. For the purpose of the study, subjective norms refer to the specific referents that dictate to or influence individuals in terms of how they should behave. Operationally, the specific referents were refer to diving buddies/partners, dive masters / instructors, and family members of the divers.

1.9 Organization of the Thesis

Basically, the research process of this thesis is carried out in five different chapters. The first chapter has introduced the reader to some background information concerning the research area and addressed the problem statement of the study. Following that, several research objectives are outlined.

Chapter Two consists of two main sections. The first section presents further insight into related theories and constructs that are linked to the prediction of environmental responsible behaviour, through the presentation of related literature. Previous works and researches associated with the relevant concepts of the present study were discussed in greater detail. The second section of the chapter examined the relevant issues arise from the preceding discussion. In relation to the issues observed, corresponding hypotheses were established for further testing in the study.

In Chapter Three, details of the methods utilised in this research are described. This chapter explains the use of a quantitative research technique, specifically the use of a questionnaire, which included the development of the assessment scale for diving attitude and divers' underwater behaviour. Distribution and data gathering methods were discussed along with response rates. The result of the pilot study and implemented statistical data analysis techniques are also discussed.

Results from the analysis of data are presented in Chapter Four, both descriptively and inferentially. A comprehensive demographic profile of the respondents is presented. All raw data are analysed, interpreted and reported in this chapter. The purification and validation of the scales were carried out, prior to analysis of data. Findings of the study

are discussed, corresponding to each hypothesis which has been established earlier in Chapter Two.

Chapter Five draws parallels between the findings of the study and those of previous research. The results are interpreted with reference to established theories and related literature review. The chapter also includes discussions on the research objectives, limitations, implication of the study, and recommendations for future research. Finally, the chapter concludes with a summary of research findings.

1.10 Summary

This chapter has presented an overview of the dive tourism industry and divers' impacts on the aquatic environment. The concern for the sustainability of the marine environment has led to the imperative and critical need to comprehend the underwater behaviours among SCUBA divers. Thus, possible antecedents that may influence divers' underwater behaviour need to be identified. This information would provide further understanding of the issue so that appropriate measures could be undertaken to mitigate the negative impacts of divers on the aquatic environment. The present chapter highlights the problem statement of the study with several major research purposes being formulated. Following that, several objectives corresponding to the purpose of the study were developed. The significance of the current study was discussed. Finally, definition of the terms and the operationalization of the constructs were explained, followed by a short summary of Chapter One. The following chapter explores pertinent literature related to the thesis.

CHAPTER 2: LITERATURE REVIEW

2.0 Introduction

This chapter presents the review of literature concerning constructs that relate to the prediction of divers' underwater behaviour. These constructs include experience level, personality, diving attitude, personal norms and subjective norms. Past theoretical and empirical studies relevant to these concepts as well as associated research that link them will be discussed in detail. The chapter provides the background knowledge of this research which is crucial for the development of a sound research framework.

2.1 Literature Review

2.1.1 Environmental Responsible Behaviour

Environmental responsible behaviour or pro-environmental behaviour is defined as any individual or group action aimed to do what is environmentally right for the protection of the environment (Sivek & Hungerford, 1990). In simpler terms, Kollmusse and Agyeman (2002) regard pro-environmental behaviour as behaviour that deliberately seeks to minimize the negative impact of one's actions on the natural and built world. These behaviours involve a conscious awareness of environmental problems by individuals and at the same time demonstrate an understanding and sensitivity with regard to the importance of environmental quality. Over the past four decades, numerous theoretical frameworks have been developed to explain pro-environmental behaviour. A few of the more influential and commonly used frameworks are the linear progression model, the rational choice framework and the normative framework.

Comparatively, the linear progression model is considered the earliest and simplest models of pro-environmental behaviour. The model is developed based on the linear progressive relationship of environmental knowledge → environmental attitude (environmental awareness and concern) → pro-environmental behaviour. The assumption of this model is that educating people about environmental issues would automatically result in more pro-environmental behaviour. This early model of the 1970's was soon proven to be inappropriate for analyzing pro-environmental behaviour. As pointed out by Owen (2000), this dependence on information to drive changes in behaviour is very difficult. He further explained that it is always difficult to change a habit, even if the new behaviour has distinct advantages over the old one. In many cases, research showed that increases in knowledge and awareness alone did not lead to pro-environmental behaviour (Kollmuss & Agyeman, 2002) .

In explaining pro-environmental behaviour, the other two frameworks frequently used are the rational choice framework and the normative framework. The rational choice framework emphasizes self-interest and utilitarian aspects (e.g. to minimize one's own risk). Whereas, the normative framework stresses on altruistic moral or pro-social motivation (e.g. the concern for other people, the next generation, other species or whole eco-systems). As noted by Bamberg *et al.* (2007), researchers who view environmental behaviour as self-interested behaviour often rely on rational choice models like the Theory of Reasoned Action (TRA) (Ajzen & Fishbein, 1980; Fishbein & Ajzen, 1975) and the Theory of Planned Behaviour (TPB) . Researchers who view environmental behaviour as pro-social behaviour tends to prefer the Norm Activation Theory (NAT) (Schwartz, 1977; Schwartz & Howard, 1981; Schwartz & Howard, 1984) as the theoretical framework. The theories related to the two approaches are described below.

2.1.2 The Theory of Reasoned Action (TRA)

The Theory of Reasoned Action (TRA) and its extended model, the Theory of Planned Behaviour (TPB), have been widely adopted as the theoretical basis for explaining human behaviour (Kang *et al.*, 2006; Sharma & Kanekar, 2007; Shim *et al.*, 2001). For example, recycling behaviour among different populations have been examined by researchers using both TRA (Goldenhar & Connell, 1993; Park *et al.*, 1998)and TPB (Boldero, 1995; Gamba & Oskamp, 1994; Vicente & Reis, 2008). The TRA theory is based on the concept that a person's behaviour is determined by the information available to him/her. It posits that a person's actual behaviour is determined by behavioural intention, which is a function of two different factors, comprises his/her attitude toward the behaviour and his/her subjective norm (Ajzen & Fishbein, 1980) (Figure 2.1). An attitude is defined as 'a person's salient belief about whether the outcome of his/her action will be positive or negative' (Ajzen & Fishbein, 1980, p. 63). Subjective norm refers to beliefs about what others will think about the behaviour. TRA assumes that individuals are usually rational and would consider the implications of their actions before making a decision of whether or not to engage in a particular kind of behaviour. To gain profound understanding of the factors influencing behaviour, Ajzen and Fishbein (1980) suggested that it is necessary to look for the determinants of the attitudinal and normative components.

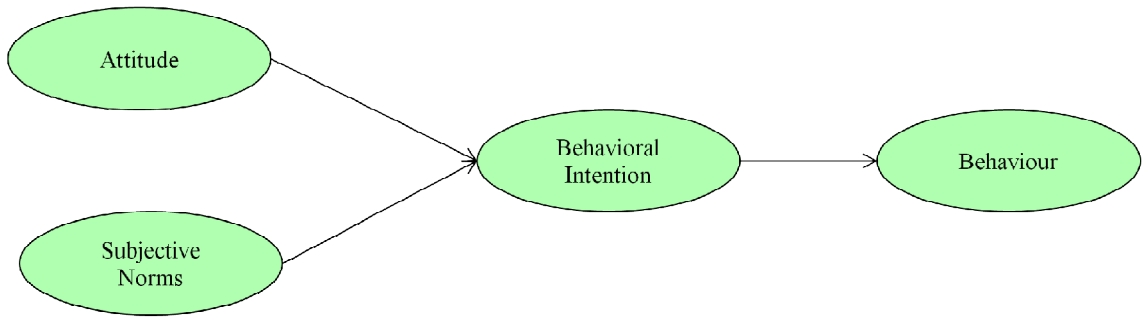

Figure 2.1: Theory of Reasoned Action Model (Fishbein & Ajzen, 1975)

For the TPB, an additional construct of perceived behavioural control is incorporated into the TRA model to explain for conditions whereby individuals do not have total volitional control over their behaviour. Perceived behavioural control refers to one's perceptions of the availability of opportunities, skills, and resources (e.g. money and time) that may either facilitate or inhibit certain behaviour. Thus, it comprises both external constraints (e.g. opportunities and facilities) and internal controls (e.g. a person's skills and abilities) that influences one's behaviour (Cho, 2008). In attitude theory, it is suggested that cognitive perception is the antecedent of affective feeling, and affective feeling is the antecedent of intentional behaviour and action.

Due to its achievement in developing a model to predict behaviour, the Theory of Reasoned Action has been the basis of researches and studies in a wide variety of fields, including psychology, management, and marketing (Sheppard *et al.*, 1988). The extended model of TRA, TPB, too has been widely used and received empirical support in explaining human behaviours (Ajzen, 1991). Several studies have demonstrated the relevance of TPB in predicting pro-environmental behaviour (Cheung *et al.*, 1999; Sparks & Shepherd, 1992; Taylor & Todd, 1995; Bamberg, 2003; Kaiser & Gutscher, 2003; Kaiser *et al.*, 1999). For example, Cheung *et al.* (1999) found that all three predictor variables (attitudes, norms, and perceived behavioural control) predict recycling intentions and actual recycling behaviour. SCUBA diving, being an appreciative recreational activity, is normally performed under volitional control of the participants. Therefore, the present study proposed to employ TRA as the basis for the model formulation, in the investigation of divers' underwater responsible behaviour.

2.1.3 The Norm-Activation Theory (NAT)

Schwartz (1973) introduced the moral Norm–Activation Theory (NAT) of altruism. This theory is based on the basic premise that personal moral norms are a direct determinant of altruistic behaviour. Personal norms refer to an individual's conviction or belief that acting in a certain way is right or wrong. It is primarily internalised. It involves individual's feelings of strong moral obligation to engage in certain altruistic behaviour. Negative self-related feelings such as regret and guilt may result from the violation of personal norms.

Primarily, activation of personal norms is influenced by awareness of behaviour's consequences (AC) and ascription of responsibility (AR). Awareness of behaviour's consequences is an individual belief that there are adverse consequences of behaviour which threaten others. On the other hand, ascription of responsibility is an individual belief that he/she may initiate actions that could avert certain behaviour consequences. According to Schwartz (1977), another factor which influences altruistic behaviour is social norms. On the whole, behaviour is depicted in terms of the interrelationship among four main constructs: personal norms, social norms, awareness of consequences, and ascription of responsibility. Oom Do Valle *et al.* (2005) stated that social norms represent values and standards somewhat dictated by specific referents (family members, friends, neighbours, or social groups) in terms of how we should behave. However, the influence of social norms on individual behaviour is not direct. It is mediated by personal norms of altruistic behaviour. The notion that personal norms mediate the relationship between social norms and pro-environmental behaviour was assessed and confirmed in least two recycling behaviour studies (Bratt, 1999; Hopper & Nielsen, 1991). It is important to note that when assessed independently from the model of

altruistic behaviour, personal norms were also found to be related to pro-environmental behaviour as well (Oskamp *et al.*, 1991; Vining & Ebreo, 1992).

In the altruistic model, Schwartz's (1977) highlighted that the cause-effect link between personal and social norms will only be effective if AC and AR are activated. Schwartz emphasized that AC and AR moderate personal norms' influence on behaviour (see Figure 2.2).

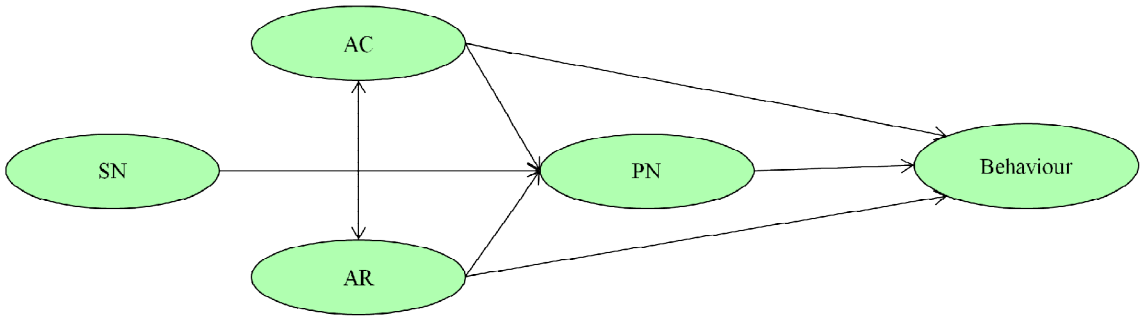

Figure 2.2: Relationship of Constructs in Norm-Activation Theory Model (Adapted from Schwartz, 1977)

Schwartz (1977) also stressed that personal norms differ from social norms in that personal norms have the presence of sanctions which are attached to one's self–concept. The behavioural impact of social norms is thought to be based on social pressure that is the fear of social sanctions. A review of literature showed that there are empirical evidences that personal norms contribute to the explanation of pro-environmental behaviours like littering (Heberlein, 1972), yard burning (Van Liere & Dunlap, 1981), energy used (Black *et al.*, 1985), environmental hazard (Stern *et al.*, 1985), recycling (Guagnano *et al.*, 1995), general environmentalism behaviour (Gärling *et al.*, 2003; Wiidegren, 1998), and green consumerism (Thøgersen & Ölander, 2006).

2.1.4 Combining TRA and NAT

Comparing the two theories of NAT and TRA, some differences and similarities are noticeable. Firstly, while NAT emphasises altruism which stresses benefits to others rather than self-interest; TRA stresses personal gain. Secondly, NAT focuses on internal norms (personal norms), whereas TRA focuses on external ones (subjective norms). Thirdly, TRA includes behavioural intentions (BI), whereas NAT does not. Nevertheless, social norms in NAT are comparable to the notion of subjective norms in TRA (Boldero, 1995).

Bamberg and Schmidt (2003) pointed out that theories are developed in different research contexts and focus on different aspects of social behaviour. It has been suggested that it is more appropriate to combine theories because of their differences rather than because of similarities. In line with this, Oom Do Valle *et al.* (2005) have demonstrated the effectiveness of integrating NAT and TPB in the prediction of pro-environmental behaviour (recycling). In the social dilemma framework, previous studies found that travel behaviour was motivated by a combination of self-interest and concern for others (Garvill, 1999; Van Lange *et al.*, 1998; Van Vugt *et al.*, 1996). Corresponding to the integration of theories, the present study started with the assumption that underwater responsible behaviour is motivated by both pro-social and self-interested motives. One way for empirically testing the feasibility of the concept of theory integration, would be to take into consideration all the constructs (i.e. attitude, subjective norms, behaviour intention, personal norms and social norms) in both TRA and NAT as antecedents in explaining underwater responsible behaviour.

Evidence from previous pro-environmental studies in transportation revealed that addition of personal norms (PN) increases TPB explanatory power regarding the

intention or behaviour under investigation (Harland *et al.*, 1999; Wall *et al.*, 2007). Thus, addition of PN to the TRA model as a predictor of intention and behaviour is feasible and reasonable. Nonetheless, assimilating personal norm into the TRA also raised the stipulation to include determinant of personal norms into this framework as well, which is social norms. In the altruistic model, influences of social norms on behaviour were explained based on social pressure, which is the fear of social sanctions. In terms of interpretation, Boldero (1995) pointed out that the concept of social norms in Schwartz's (1977) model of altruistic behaviour is comparable with the notion of subjective norm in the TRA model. Therefore, subjective norms were used to represent social norms.

However, behaviour intention was excluded from the framework, due to its absence in NAT and difficulty of measurement. The present study is based on the assessment of respondents' past decisions or motives that guide the current underwater behaviour, not referring to future intention. Hagger *et al.* (2002) have reported that the effects of past behaviour on physical activity participation intentions and behaviour were .37 and .55 respectively after controlling for effects of the variables in TPB (e.g. attitudes, subjective norms, intentions and perceived behavioural control). Similar results were earlier reported by Bagozzi (1981) , Fredricks and Dosseit (1983), and by Bagozzi and Warshaw (1990) relating to TRA model. Thus, the construct of behaviour intention was excluded, as past behaviour appears to have higher predictive power on current behaviour. Furthermore, intentions do not always translate into actions (Chatzisarantis *et al.*, 1997).

If behaviour intention was to be included, a period of time is necessary to observe/justify whether the measured intention in fact have been translated into actual

responsible behaviours. This procedure would be difficult to be operationalized because locating the divers again would be a problem. Sheeran and Orbell (1998) have raised the methodological issues about the time-lag between measurement of behaviour intention and behaviour. Normally, the behaviour intention – behaviour relation tends to diminish when the measurement gap between the two exceeds a few months.

Consequently, attitude toward diving and subjective norms from TRA were regarded as antecedents of underwater behaviour. Personal norms from NAT were included as an additional variable. Therefore, the independent variables in the proposed model of underwater responsible behaviour consist of diving attitude, subjective norms, and personal norms.

2.1.5 Studies on SCUBA Diving

Since the invention of self-contained underwater breathing apparatus in 1942 by Jacque Yves Cousteau and Emily Gagnon, SCUBA diving has been growing fast to become a popular marine-based recreational activity. In its early years, SCUBA diving was perceived as a low impact activity attuned with the sustainable use of marine resources. However, concerns over the detrimental effects of growing divers' visitation to coral reefs have spurred increasing impact studies of SCUBA diving activities to be conducted in the 1990s (Allen, 1992; Davis & Tisdell, 1995; Dixon *et al.*, 1993; Harriott *et al.*, 1997; Rouphael, 1995). The negative impacts of SCUBA divers on the coral reef were evident in various studies conducted in different parts of the world such as the Northern Red Sea (Riegl, 1991), Egypt (Hawkins & Roberts, 1992), the Caribbean Island of Bonaire (Dixon *et al.*, 1993), Australia (Harriott *et al.*, 1997), among others. Studies indicated that damages caused by divers to coral reef were mainly through direct physical contact with their hands, bodies, equipment and fins

(Hawkins *et al.*, 1999; Rouphael & Inglis, 1997; Talge, 1992). Harm may also be caused indirectly, by stirring up benthic sediment which results in suffocation of the coral polyps (Rogers, 1990; Zakai & Chadwick-Furman, 2002). Impacts of SCUBA diving activities have been continued to be researched well into the new millennium (Barker & Roberts, 2004; Hasler & Ott, 2008; Leujak & Ormond, 2008; Saphier & Hoffmann, 2005; Walters & Samways, 2001). Besides diver's contacts, Saphier and Hoffmann (2005) noted that some of the visible and unseen anthropogenic stresses to the coral reef ecosystem caused by SCUBA diving activities include anchor damage, copper emission from antifouling paint, oil discharge, untreated sewage and toxic cleaning products. Concerned over the impacts of marine ecotourism to the aquatic environment and diving industry, Cater (2003) advocated the importance of collaborative efforts among stakeholders to live up to the reputation of sustainable tourism.

In mitigating the negative effects of SCUBA diving activities, research have focus on the examination of the carrying capacity of dive sites (Davis & Tisdell, 1995; Harriott *et al.*, 1997; Hawkins *et al.*, 1999; Rouphael & Inglis, 1997; Schleyer & Tomalin, 2000; Zakai & Chadwick-Furman, 2002; Mumby *et al.*, 2007). As a guide, the estimated carrying capacity for a dive site was proposed to be about 5000-6000 guided dives per site per year (Zakai & Chadwick-Furman, 2002).

Realizing that education is an important way of reducing divers' impacts on the reef, recent studies have focused on the types of intervention/education that may alter divers' underwater behaviour (Barker & Roberts, 2004; Belknap, 2008; Camp & Fraser, 2012; Dearden *et al.*, 2007; Medio *et al.*, 1997; Thapa *et al.*, 2005). Medio *et al.*'s (1997) study found that divers did less damage after they participated in an in-water

demonstration and an illustrated dive briefing concerning issues associated with reef biology and implications of divers' contacts with coral and other marine species. Dearden *et al.* (2007) reported that interpretation offered on dive boats increased diver perceptions and awareness of recreation impacts on marine environments. A recent study by Camp and Fraser (2012) revealed that divers who had participated in environmental conservation courses such as PADI, Project AWARE or REEF (Reef Environmental Education Foundation), interacted with the reef as many times as those who had not. The result showed that previous conservation education of divers did not influence diver behaviour in the water. Nevertheless, the level of conservation education provided in the dive briefings did influence diver behaviour by reducing the number of interactions diver made with the reef (Camp & Fraser, 2012). Thus, the depth (level) or content of the environmental conservation courses prepared by the diving certification organizations needs further improvement. The significant roles of education and interpretation have lead to the advocacy of Low Impact Diving (LID) that is being practised in many diving organizations, such as Underwater Volunteers New South Wales (UVNSW), Byron Underwater Research Group (BURG) in Australia, and Save Ontario Shipwreck (SOS) in Canada, among others.

In recent years, the United Nations Environment Program has emphasizes public involvement in environmental monitoring and management (Sharpe & Conrad, 2006), which provides an avenue to overcome the economic constraints on the implementation of global conservation monitoring programs to build up-to-date databases. In response to this, SCUBA diving research programs have begun to solicit divers as volunteers, employing their natural interest in marine life and diving skills to involve in marine monitoring programs. Example of these research projects are: Coral Cay Conservation in Belize (Mumby *et al.*, 1995), Fish Survey Project, conducted in Florida and the

Caribbean (Pattengill-Semmens & Semmens, 2003), and Reef Check, on a global scale (Hodgson, 1999). The participation of recreational SCUBA divers as volunteers to collect data for marine conservation research has also showed encouraging results in the Italian Mediterranean Sea (Goffredo *et al.*, 2010; Goffredo *et al.*, 2004) and Australia (Hammerton *et al.*, 2012). Primary motivations for recreation divers to engage in marine conservation programs were a desire to contribute to environmental conservation and to increase personal knowledge and diving skill-base (Hammerton *et al.*, 2012). It was noted that among the benefits of involving volunteer divers in this kind of data collection include cost efficiency, coverage of large spatial scales, education and enhancement of people's feelings of 'ownership' of their environment, increasing general awareness of environmental problems and intensifying relationships between stakeholders (Evans *et al.*, 2008; Foster-Smith & Evans, 2003; Goffredo *et al.*, 2004; Sharpe & Conrad, 2006)

In view of the potential market growth in diving tourism, Garrod (2008) have suggested three approaches of market segmentation to assist in formulating and implementing effective planning, management and marketing strategies. The three approaches were segmentation based on involvement/specialisation, the travel career approach and benefits segmentation. From the marketing perspective, many studies have been undertaken to identify dive preferences and environments that are important to divers' experience (Lim & Spring, 1995; Maccarthy *et al.*, 2006; Musa, 2002; Musa *et al.*, 2006; Salih, 2000; Tabata, 1992). Among the important underwater features that appeal to divers were presence of marine life, coral reef, quality of ocean conditions (visibility), and underwater geology (Musa *et al.*, 2006). Additionally, divers' satisfaction were also gained from other related peripheral experiences surrounding the dive such as safety,

service provided by the operator, the social interaction with other divers and the functional aspects of the dive (Fitzsimmons, 2008; Maccarthy *et al.*, 2006).

In terms of motivation, quite a numbers of quantitative research have examined the various reasons for divers to travel to diving destinations (Cater, 2008; Dearden *et al.*, 2006; Meisel-Lusby & Cottrell, 2008; Meyer *et al.*, 2003; Musa *et al.*, 2006). Todd *et al.* (2002) identified six diving motivational factors which are adventure, learning, escape, social interaction, status and personal challenge. The majority of the researchers agreed that the most significant motives were related to the diving environment or to the thrill of diving itself (Dearden *et al.*, 2006; Meisel-Lusby & Cottrell, 2008; Musa *et al.*, 2006). Based on Beard and Ragheb's (1983) four motivations of leisure pursuit, Cater (2008) explained that diver's motivations changes as their experience level increased. It was observed that experienced divers become less involved in 'novelty seeking' compared to 'early-career' divers. More experienced divers tend to develop their skills in a variety of ways so that they can engage in more technical diving activity, meaning they may develop a more 'intellectual' approach to diving. Cater (2008) reported that diver's initial desire to view charismatic mega-fauna was steadily replaced by a fascination with smaller underwater inhabitants.

Using qualitative approach, Dimmock (2009) revealed four diving motivations among divers which were physical, social, psychological and visual factors, based on the concept of 'comfort'. The researcher observed that divers experience social comfort in-water when diving with people who are part of their immediate social world (significant others); that is, a spouse, parent, sibling or friend. The adventure social group seems to provide comfort in the management of risk and safety (Dimmock, 2009), which also provide information, support and motivation to others through sharing of experiences

(Stebbins, 2002; Stokowski, 1994). Applying the concept of 'eudaimonia' (the good life or flourishing) in a qualitative research, Kler and Tribe (2012) found that divers gain meaning and fulfilment from the acts of learning and personal growth. Divers are motivated to dive because the activity endorses positive experiences, which may lead to the good life. The growing qualitative researches offer further understanding of spiritual aspect and the inner self of divers that could enrich the SCUBA diving literature.

In explaining divers' underwater behaviour, numerous studies have been conducted on the identification of divers' demographic profile and behaviour characteristics (Barker & Roberts, 2004; Mundet & Ribera, 2001; Rouphael & Inglis, 2001; Thapa *et al.*, 2006; Todd *et al.*, 2000; Walters & Samways, 2001). Walters and Samways (2001) found that photographers and the less experienced divers have collided more with corals while diving underwater. Thapa *et al.* (2006) noted that there is a positive correlation between the level of diver specialization and marine based environmental behaviours.

A summary of studies on SCUBA diving is presented in Table 2.1. From the table, limited diving studies have acknowledged the positive attitudes of divers towards reef management preferences (Ditton, 2002; Edney, 2012; Todd *et al.*, 2000). In explaining environmental behaviour, it was recognized that the socio-psychological factors such as the constructs of values, attitudes, beliefs, personal capabilities have shown better results than other socio-demographic factors (Haddock & Zanna, 1998; Salz & Loomis, 2005; Hunecke *et al.*, 2007). However, limited studies were conducted to investigate the antecedents affecting divers' underwater responsible behaviours from the 'social psychological' perspective, except Thapa *et al*. (2006) and Musa *et al.* (2011). From the review of diving literature, it is evident that research examining the influences of personal 'social psychological' variables on divers' underwater behaviour is still

Table 2.1 A Brief Summary of Studies on SCUBA diving

Authors	Related Topics
Rogers, 1990; Riegl & Velimirov, 1991; Allen, 1992; Hawkins & Roberts, 1992; Tagle, 1992; Dixon *et al*., 1993; Davis & Tisdell, 1995; Rouphael & Inglis, 1995; Harriot *et al.*, 1997; Rouphael & Inglis, 1997; Hawkins *et al.*, 1999; Walters and Samways, 2001; Zakai & Chadwick-Furman, 2002; Barker and Roberts, 2004: Hasler & Ott, 2008; Leujak & Ormond, 2008, Cater, 2003.	Impact of SCUBA diving activities on coral reef.
Davis & Tisdell, 1995; Rouphael & Inglis, 1997; Harriott *et al.*, 1997; Hawkins *et al.* 1999; Schleyer and Tomalin, 2000; Zakai & Chadwick-Furman, 2002; Mumby, Hastings, & Edwards, 2007.	Carrying capacity of coral reefs for SCUBA diving
Medio, Ormond & Pearson, 1997; Barker & Roberts, 2004; Thapa *et al.*, 2005; Dearden, Bennett, & Rollins, 2007; Camp & Fraser, 2012.	Intervention (briefing & education) on divers' underwater behaviour and Low Impact Diving (LID)
Mumby *et al.* 1995; Hodgson, 1999; Pattengill-Semmens & Semmens, 2003; Foster-Smith and Evans 2003; Goffredo, Piccinetti, & Zaccanti, 2004; Evans, Gebbels & Stockill, 2008; Goffredo *et al.*, 2010; Hammerton *et al.*, 2012.	Positive impacts of recreational divers' involvement in the marine environmental monitoring program
Garrod, 2008; Tabata, 1992; Lim & Spring, 1995; Davis *et al.*, 1996; Salih, 2000; Musa, 2002; MacCarthy, O'Neill & William, 2006; Musa, Kadir & Lawrence, 2006; MacCarthy, O'neill & Williams,2006; Fitzsimmons, 2008.	Diver customer satisfaction
Todd, Graefe and Mann, 2002; Meyer, Thapa & Pennington-Gray, 2003; Cater, 2008; Dearden, Bennett & Rollins, 2006; Meisel-Lusby & Cottrell, 2008; Musa *et al.*, 2006; Dimmock 2009; Kler & Tribe, 2012, Cater, 2008.	Diver motivation
Walters & Samways, 2001; Mundet & Ribera, 2001; Rouphael & Inglis, 2001; Todd, Cooper & Graefe, 2000; Barker & Roberts, 2004; Thapa, Graefe & Meyer, 2006.	Divers' demographic profile and diving behaviours

Todd, 2001; Ditton *et al.*, 2002; Edney, 2012; Thapa *et al.*, 2006; Musa *et al.*, 2011	Divers' attitude and diving behaviour

relatively unexplored and much desired. Thus, the present study aim to further examine divers' underwater responsible behaviour from the socio-psychological aspects, which involve personal variables such as experience, personality, environmental attitude and diving attitude together with the normative factors of social norms and personal norms.

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2.1.6 Underwater Behaviour

The present research is concerned with what divers do when diving underwater. Underwater behaviour is referred to as specific responsible behaviour exhibited by divers towards both own safety / health and the protection of marine environment, while diving underwater. Irresponsible underwater behaviour of divers such as holding, trampling, kneeling on coral, kicking of fins and hitting of coral by loose equipment caused severe harm to coral reefs (Barker & Roberts, 2004; Hawkins *et al.*, 1999; Leujak & Ormond, 2008; Rouphael & Inglis, 1997; Walters & Samways, 2001). Comparatively, fins cause most damage to the reef, followed by hands, knees and diving equipments (Rouphael & Inglis, 1997). Indirect damages to the coral can also be caused by fin kicks of divers, which stir up benthic sediment that covers and suffocate the coral polyps (Rogers, 1990; Rouphael, 1995; Zakai & Chadwick-Furman, 2002). In relation to this, several studies have indicated that a large proportion (70–90% depending on the study) of divers contact the reef during their dive (Harriott *et al.*, 1997; Rouphael & Inglis, 2001; Talge, 1992). Though impacts from individual divers may be minor, the cumulative impacts of divers can be substantial (Harriott *et al.*, 1997; Ramanaiah *et al.*, 2000; Rouphael & Inglis, 2001).

In an effort to minimise the detrimental impacts of divers on coral reefs and marine ecological system, several guidelines for recreational diving were forwarded by marine conservation organisations. According to standard requirements for recreational SCUBA diving proposed by ICRAN MAR 1 (International Coral Reef Action Network-Mesoamerican Reef,(2006), divers must obey all applicable local and national laws and regulations on diving activity. These guidelines include, avoid interactions with marine life, maintaining an awareness of fins, use of equipment and handling of underwater cameras, adjusting buoyancy and securing equipment from contacting corals or stirring up sediments while diving. Divers are expected to dive safely, both for their health and for the protection of marine environment. Divers are not allowed to touch or contact corals or other reef dwelling organisms. On top of that, they are not to stand and rest on coral reefs. Spearing any marine life or chasing, harassing or trying to ride marine life such as turtles, manatees and whale sharks, feeding fish or any other marine life are strictly prohibited. Collection of shell and corals as souvenirs is not allowed. In addition, META (Marine Ecotourism for the Atlantic Area, 2001) advocated that the codes of conduct for responsible divers include regular review and update of diving skills such as buoyancy control, finning and underwater positioning. This would promote divers' safety and minimise negative impacts on marine environment.

Numerous researchers have emphasized that much diver damage on coral reefs is unnecessary and can be avoided by modifying diver behaviour (Hawkins & Roberts, 1997; Medio *et al.*, 1997; Rouphael, 1995). With regards to this, Medio *et al.* (1997) found that divers did less damage to the reef after they were given a 45-minutes diver education session before the dive. However, Barker and Roberts (2004) discovered that one-sentence environmental reminders given by local staff had no effect on contact rates of divers. They indicated that the assistance of dive guides can greatly reduce the

negative impacts of divers. Among these are, use of underwater intervention if divers contact the reef, leading by example in keeping fins and equipment clear of the reef, and by extra vigilance toward camera users, on night dives and at the beginning of dives.

Researchers have employed both observational and self-reporting techniques to examine divers' underwater behaviour. Many of the observational studies have concentrated almost exclusively on measuring negative impacts caused by underwater behaviour of divers (Barker & Roberts, 2004; Medio *et al.*, 1997; Rouphael & Inglis, 1997; Tratalos & Austin, 2001). As for self-reported methods, most surveys of divers have focused on aspects of social carrying capacity (Davis & Tisdell, 1995), environmental concerns and beliefs (Todd, 2000), diver motivations (Todd, 2002), educational benefits (Townsend, 2003), and diver perceptions of impacts (Dearden *et al.*, 2007). Using self-reporting methods, Thapa *et al.* (2005) have identified three dimensions in explaining SCUBA divers' marine-based environment behaviour. The three dimensions were named contact behaviour, general diving behaviour and general education behaviour. Fourteen items were involved in measuring the marine-based environment behaviour, which explained 49% of the variance of the construct. In Musa *et al.*'s (2011) study, divers' marine-based underwater behaviour was measured by ten items, representing a single factor, which explained 73% of the variance. The literature revealed that there is inconsistency of dimensionality and stability in the measurement of SCUBA divers' underwater behaviour. Thus, the present research attempts to investigate and clarify the discrepancy that exists in the measurement of SCUBA divers' underwater behaviour. The following section will examine the role of experience.

2.1.7 Experience Level

Experience is generally understood as a concept which comprises the knowledge of or skill in certain thing or some event, due to exposure to or involvement in that thing or event. In the context of recreational activity, Virden (1992, p. 6) recognised past experience as the sum of accumulated life experience a recreationist has within a particular recreational activity or 'style of participation'. The effect of past experience on an individual is reflected in the skill level of the recreationist, as well as how the recreationist feels, behaves and makes decisions. Several researchers (Shinew, 1993; Williams *et al.*, 1990) have contended that an individual's past experiences can influence their present leisure behaviour. The way recreationists mentally organize/structure information and make decisions can be explained by cognitive theory. With reference to cognitive theory, Scott and Shafer (2001) explained that as people gain experience in an activity, "their cognitions become increasingly complex and they have more information they can use to evaluate participation… [this] can actually lead to a change in the types of decisions and choices recreationists make" (p. 335).

Generally, there exists a relationship between experience and attitude that influence behaviour. According to Fazio (1989), people's attitudes are more likely to guide behaviour when they are easy to retrieve from memory. Based on direct experience, attitudes appear to be easily accessible and thus influence behaviour. It is believed that both direct experience and personal involvement encourage individuals to think about their attitudes. Consecutively, this cognitive effort increases the regular availability of attitudes as a basis for future behaviour (Petty, 1995)

Different measurements related to experience level and skill were utilised to identify different categories of recreationists. Among these measurements were Experience Use

History (EUH) and recreation specialization introduced by Bryan (1977). Experience Use History was developed by Schreyer *et al.* (1984), which included three variables: 1) total river trips, 2) total number of rivers run, and 3) number of trips on the sample river, using river rafters as respondents. According to Schreyer *et al.* (1984), experience use history refers to "the amount and extent of participation by the individual in recreational pursuits" (p. 34). EUH has been generally used to categorize participants into distinct, identifiable homogeneous segments utilizing frequency of participation, type of participation, and place of participation (Schreyer & Beaulieu, 1986).

In the measurement of recreational specialization, past experience and frequency of participation have been used by many scholars as indicators to measure level of specialization. This approach continues to be used by some researchers as a way of measuring a recreationist's level of specialization or intensity of behavioural involvement in an activity (Choi *et al.*, 1994; Donnelly *et al.*, 1986; Williams *et al.*, 1990). In fact, the concept of experience use history (EUH) reflects the behavioural aspect of the measurement of specialization. Hammit *et al.* (1989) argued that "EUH has to be a phenomenon closely related to the specialization process". Both Schreyer and Beaulieu (1986) and Ewert and Hollenhorst (1994) have applied the principals of EUH as a measure of specialization.

Studies concerning relationship between recreation specialization and pro-environmental orientations generally support Bryan's (1977) propositions. Specifically, increases in the level of specialization have been related to more environmental concern and greater emphasis on environment conservation issues. Katz (1981) found that anglers with higher involvement in angling activity were more committed towards specific environmental issues. More specialized anglers were found to focus on non-

consumptive use and supported regulations for resource protection (Chipman & Helfrich, (1988). Among canoeists, (Kauffman, 1984) discovered that highly specialized canoeists were more likely to demonstrate greater sense of environmental concern. In Mowen *et al.*'s (1997) study, highly specialized recreationists showed greater concern on site-specific environmental issues compared to general environmental issues. Among mountaineers, (Dyck *et al.*, 2003) noted that highly specialized climbers were more aware of low impact practices, and portrayed more favourable attitudes towards such practices. Although the literature has reported certain degree of correlation between experience level or specialization and environmental concern, the relationship of these constructs to environmental behaviours is still vague, especially among SCUBA divers.

A review of literature indicated that there is a relationship between experience and damaging behaviour among divers. Through an observational study, Davis and Tisdell (1995) found that more experienced divers made significantly less contact with the reef compared to the less experienced divers. They found that inexperienced divers tend to contribute more to environmental damage than skilled divers because of their inability to control buoyancy under the surface. A direct result of this lack of control is the stirring up of silt clouds that suffocate and kill organisms, as well as touching, bumping, and crashing into shipwrecks, reefs, and other ecologically and culturally significant resources.

Talge (1992) reported that lack of technical competence among inexperienced divers cause inappropriate behaviours, such as direct physical contact, that often lead to irreversible damages or death of the coral. This was noticed and supported by other researchers (Harriott *et al.*, 1997; Rouphael & Inglis, 1997) who have identified

'variation in technical competence' among divers as the causes of contacts and breaking of fragile marine organisms. Experienced divers with higher confidence levels have the ability to adapt to different diving situations, such as strong currents, poor visibility, or different diving environments, which can reduce contact with marine environments.

Roberts and Harriot (1995) had reported a trend of divers with more advanced levels of training to make fewer impacts on the marine environment. This was supported by a study conducted by Walters and Samways (2001) , which revealed that novice divers made one damaging contact per 6 dives, moderately experienced divers about once every 14 dives, and very experienced divers about once every 23 dives.

On the other hand, Harriot *et al.* (1997) found no significance differences in the total number of contacts or impacts made by divers with different levels of experience. Their reason was that less experienced divers are more cautious in their diving activity. This observation was also reported by Rouphael and Inglis (2001) who found there is no strong relationship between dive experience and damaging behaviours of divers. In view of the contradicting evidence concerning relationship between experience and divers' underwater behaviour, the current study included experience level as an independent variables in order to re-examine its relationship with divers' underwater behaviour.

Researches on SCUBA divers' experience have employed indicators such as number of dives completed in a lifetime, level of certification, or self-rating experience to represent level of experience (Musa *et al.*, 2011; Todd, 2000; Todd *et al.*, 2000). In the present study, the measurement of experience level incorporates the two dimensions of behavioural and cognitive components in the recreational specialization (Bryan, 1977)

concept. Behavioural component is represented by the total number of dives made, while cognitive component is measured by level of certification and self-rating experience. The following section examines the role of personality on behaviour.

2.1.8 Personality

Personality is generally recognised as a pattern of characteristic thoughts, feelings, and behaviours that distinguishes one person from another and that persists over time and situation (Phares, 1991). Schultz and Schultz (2009, p. 9) suggested that personality is "an enduring and unique cluster of characteristics in individuals, that may change in response to different situations". This explanation was forwarded on the premise that similarities exist among people, and yet each of us possesses special properties that distinguish us from all others. However, more precise definitions of personality were offered by different personality theorists with reference to individual view points, personal vision and the nature of personality.

Primarily, personality research has focused on two aspects of individuals, that is, the total individual and individual differences (Pervin, 1989). Research concerned with the total individual centres on the complex relationships among various aspects (e.g., motivation, learning) related to how one functions in the world. The studies that emphasized on individual differences were concerned with how people differ from each other. These individual differences are related to the tendency for the behaviours of different individuals to fall at different points along various behavioural dimensions (Potkay & Allen, 1986, p. 6).

Theories related to personality and the developments of personality have flourished, since the study of personality became formalized and systematized in the late 1930's,

led by the work of Gordon Allport. Since then, a variety of approaches concerning the study of personality have emerged. The five distinct perspectives of personality theories that have been noted by Ryckman (1997) as: a) psychoanalytic and neo-analytic perspective; b) trait perspective; c) cognitive perspective; d) humanistic/existential perspective; and e) social-behaviouristic perspective.

The psychoanalytic and neo-analytic perspective of personality theory explained human behaviour in terms of the interaction of various components of personality (Adler, 1924; Freud, 1920; Horney, 1950; Jung, 1968). This school of researchers emphasized the role of the unconscious mind and the importance of childhood experiences in shaping adult behaviour. They advocated that part of our personality is innate, and part is learned (Schultz & Schultz, 2009).

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The scholars of trait perspective asserted that much of our personality is inherited (Allport, 1937; Cattell, 1965; Eysenck, 1947). It is believed that every person has a small number of specific traits that predominate in his or her personality, which is known as a person's central traits. Traits are dispositional factors that regularly and persistently determine conduct in a variety of everyday situations (Furnham, 1990).

The cognitive perspective of personality emphasized the importance of conscious mental activities (Kelly, 1955). The basic principle behind cognitive theory is the idea that the way we think about or perceive ourselves and others, establishes how we respond to the world with our emotions and behaviours. It perceives that people's personality is never completely determined; people change and reinterpret their experiences in distinctive ways (Ryckman, 1997).

The humanistic or existential perspective of personality theory emphasized that people have free will, and they play an active role in determining how they behave (Maslow, 1954; Rogers, 1951). Humanist theorists stressed the concept of self-actualization. It postulates the existence of an innate growth that moves individuals towards the realization of their potential if environmental conditions are right (Ryckman, 1997).

The social-behaviouristic perspective explains personality in terms of the effects external stimuli have on behaviour (Bandura, 1977; Skinner, 1950). The behavioural theory suggests that personality is a result of interaction between the individual and the environment. According to Ryckman (1997), this theory presumed that most of our behaviour is learned and purposeful; we are guided by our motives to attain certain objectives.

Therefore, a definition of personality depends to a large extent on one's theoretical orientation. A trait perspective was selected for this study because it was consistent with the purpose of the study to explore individual differences among divers which relates to their underwater behaviours. Hence, an individual's personality was defined as 'a set of points falling along several behavioural dimensions, each corresponding to a trait, resulting in a unique profile (i.e., type), different from that of other individuals' (Pervin, 1989, p. 7).

Gordon Allport (1935), one of the pioneers in personality study, viewed traits as distinguishing characteristics residing in the individual that guide behaviour. He concluded that personality traits consist mainly of five characteristics. Firstly, personality traits are real and exist within each of us. Secondly, traits determine and cause human behaviour. The third characteristic is that traits can be demonstrated

empirically. The following characteristic is that traits are interrelated; they may overlap, even though they represent different characteristics. The final characteristic is that traits vary with the situation.

Allport stressed the importance of genetic factors in the formation of traits and this is supported by a growing body of research (Schultz & Schultz, 2009). Pervin (1989) recognised traits as a relatively stable tendency or disposition for an individual to react in a particular way over a wide range of situations.

Among trait theorists, different approaches and measurements were used to explain personality traits. Cattell (1965) postulated a two-tiered personality structure with sixteen primary traits as the basic factors of personality, which was named the Sixteen Personality Factor (16 PF) Questionnaire. The 16 PF is widely used to assess personality for research, clinical diagnosis, and predicting occupational success. Based on Cattell's scheme, Eysenck and Eysenck (1975) developed Eysenck Personality Questionnaire (EPQ) to describe human personality with reference to three dimensions- extraversion, neuroticism and psychoticism. These dimensions were described as combinations of traits or factors. The EPQ is a reliable research tool that is validated by criterion analysis and the three dimensions have been found consistently in more than 35 nations. However, some comments have been raised concerning the questionnaire's dichotomous items (yes/no questions) which forces a sometimes inaccurate response, and it can be psychometrically inferior (Schultz & Schultz, 2009).

Discontent with Cattell's concept of too many factors and Eysenck's idea of too few dimensions, McCrae and Costa (1985) have identified five core dimensions that form the basis of our personality. These dimensions, known as Big Five factors, were

extraversion, neuroticism, agreeableness, conscientiousness and openness to experience. The descriptions of each factor are as follows:

- Neuroticism - emotionally reactive, nervous, insecure, worried
- Extraversion – sociable, talkative, fun-loving, affectionate
- Openness to experience – original, creative, daring, independent
- Agreeableness – good-natured, courteous, friendly, trusting
- Conscientiousness - dutiful, careful, reliable, organized, hardworking

A personality test known as NEO Personality Inventory (NEO-PI) was developed by McCrae and Costa (1985; 1987). Consistent findings of the same factors from different assessment procedures by other researchers suggest that these factors can be relied on as distinguishing aspects of personality.

McCrae and Costa (1999) posit that the five factors are biologically based, to be unaffected by the environment, and thus to be unchanged across the span of adult life. Each of the five factors is said to give rise to an average, overall dispositional tendency in the individual's thoughts, feelings, and actions. The factors constitute "the core of personality" (McCrae & Costa, 1996, p. 69) and thus "define the individual's potential and direction".

McCrae and Costa (1997, p. 515) noted that the Five Factor Model (FFM) and their traits appear to represent 'a common human structure of personality' that transcends cultural differences, which were evident in personality studies conducted in more than 50 diverse nations. The FFM is a version of trait theory that views human nature from the perspective of consistent and enduring individual differences. Besides, findings have shown that the Five Factor model demonstrates a high level of stability in longitudinal

research (Costa & McCrae, 1988). The five factors were detected in children as well as adults. As noted by Revelle and Loftus (1992), these dimensions are stable across a life span and seem to have a physiological base. Today, the Big Five factors have emerged as the dominant framework for studying personality, with the weight of a considerable amount of empirical research behind them (Digman, 1990; McCrae & John, 1992). A major advantage of the FFM is that it provides a comprehensive yet parsimonious taxonomy of personality traits at the highest hierarchical level of trait description (Digman, 1990). As supported by Howard and Howard (1998), most personality researchers regard FFM as the most comprehensive model of personality to date. Thus, the present research utilized the FFM as a measurement of personality of divers.

Based on FFM, Goldberg (1999) introduced the International Personality Item Pool (IPIP) to be freely available online for the convenience of usage. Primarily, the IPIP items were developed for measuring constructs of interest in personality and individual differences research. These items measure a range of constructs and many sets of items have been developed as proxies of some widely known commercial and previously published personality inventories (Cooper *et al.*, 2010).

Several researchers have indicated that a positive relationship exists between personality and environmental concern. In exploring the relation between personal characteristics and the consumer's ecological concern, Kinnear *et al.* (1974) found that individuals with tolerant and comprehensive personality, demonstrate greater ecological concern. Utilizing personality variables to examine several ecological behaviour patterns (i.e. energy conservation, purchase and ecological use of products, environmental interest, use of ecological transport systems), Balderjahn (1988) revealed that personality influenced on saving energy and on the ecological buying and use of products. Witt

(2002) noted that extrovert and responsible people will try to improve their environmental conduct. Fraj and Martinez (2003) indicated that antecedents of consumers' real commitment with the environment include extroversion, solidarity and responsibility characteristics.

Using the 'Big Five' taxonomy of personality traits to examine specific attitudes and value orientations, Hirsh and Dolderman (2007) found that agreeableness and openness to experience are prominent predictors of pro-environmental values. In another study, Hirsch (2010) reported that four personality factors: agreeableness, openness to experience, neuroticism and conscientiousness have significant positive association with environmental concern.

Hirsh (2010) explained that both agreeableness and openness to experience in individuals are associated with the higher order personal value of self-transcendence, reflecting an expanded sense of self and a greater concern for others. Hence, they become more empathic and likely to develop a personal connection with nature, which in turn predicts their pro-environmental attitudes (Mayer & Frantz, 2004). As for neurotic individuals, they generally tend to be more worried about negative outcomes. For instance, their concern about the environment may result from the feeling of anxiety about the consequences of environmental degradation. Thus, it is possible that neurotic individuals would demonstrate a more egoistic form of environmental concern, rather than an altruistic one (Schultz, 2001). According to Lodi-Smith and Roberts (Lodi-Smith & Roberts, 2007), conscientiousness is generally linked to higher levels of social investment and prudent rule-adherence. Hence, highly conscientious individuals are prone to carefully follow social norms and guidelines in depicting environmentally responsible behaviour.

A study on SCUBA diving by Musa *et al.* (2011) reported that neuroticism and agreeableness were two significant predictors of divers' underwater behaviour among the five personality traits. This study revealed that highly agreeable divers were less irresponsible underwater, while highly neurotic divers were found to be more irresponsible underwater. It was explained that agreeable people are more responsible (Letzing, 2008), thus demostrating a positive underwater behaviour.

In fact, Musa *et al.*'s (2011) study was the first study to examine the influence of personality on divers' responsible behaviour underwater. However, several limitations were observed. The validity of the findings may be affected by the use of convenience sampling (snowballing), in which information on SCUBA diving behaviour from respondents, was not collected on-site. The convenience sampling technique used may have drawn the attention of divers with a certain type of personality (e.g. agreeableness). Another observed limitation is that, the study involved a limited list of responsible behaviour items to represent the one factor-responsible underwater behaviour, which was derived from factor analysis. Thus, the current study attempts to address these limitations, along with the inclusion of the examination of SCUBA diving attitudes which have not been examined by previous research. The following section examines the concept of attitude and its roles in influencing behaviour.

2.1.9 Attitude Structure

Attitudes have been widely studied by social psychologists and there are many well-founded conceptualizations of attitudes. Mainly, there are two well-established perspectives on attitude structure (Olson & Maio, 2003), which focus on the capacity of attitudes to express more basic psychological constructs, such as beliefs and emotions.

These two perspectives are commonly known as the three-component model and the belief-based model.

In the three-component model, attitudes relate to the feelings, beliefs, and past behaviours concerning an attitude object (Zanna & Rempel, 1988). For example, individuals may have a positive attitude toward taking part in environmental recycling campaign because they enjoy recycling (affective component) and believe that the recycling will warrant cleaner environment (cognitive component). More delicately, individuals might participate in the recycling campaign because it reminds them of the past experience in which they have performed pro-environmental recycling behaviours (behavioural component). Thus, attitude of individuals may be deduced by recalling their past behaviour related to the issue (Bern, 1972; Olson, 1990; Olson, 1992).

As explained by (Eagly & Chaiken, 1993), people may develop a general positive or negative evaluation that recapitulates their responses, based on the affective, cognitive, and behavioural components. Once developed, these evaluations may also form the feelings, beliefs, and behaviours to make them more consistent with each other. Consequently, people who have positive attitudes toward an object should often possess beliefs, feelings, and behaviours that are favourable toward the object. On the other hand, people who have negative attitudes toward an attitude object would often possess beliefs, feelings, and behaviours that are unfavourable toward the object.

However, the belief-based model suggests that attitudes are simply affective responses to an object that are influenced by beliefs alone (Fishbein, 1967; McGuire, 1960; Wyer, 1970). As an example, people might take part in a pro-environment rally because they believe that the rally will increase the availability of public transport and that the rally

will help build solidarity among environmentalists. Notably, people may hold inherent expectancies about the likelihood that each belief is valid.

Regarding the validity of these two perspectives on attitude structure, empirical evidence supports each of the perspectives to some extent. Nevertheless, it can be argued that the three-component model is predominantly stronger. The basis for the support of this view is the simple fact that the 3-component model is consistent with the data supporting the belief-based model, while also explaining data that cannot be explained by the belief-based model. Consistent with the three-component model, people's feelings, beliefs, and behaviours toward an attitude object are correlated, but distinct (e.g., (Breckler, 1984; Breckler & Wiggins, 1989; Crites *et al.*, 1994; Haddock & Zanna, 1998; Trafimow & Sheeran, 1998). In addition, previous study indicated that there are at least moderate correlations between attitudes and the expectancy-value products (e.g., (Budd, 1986; Fishbein & Coombs, 1974; Van der Pligt & De Vries, 1998), supporting the belief-based model. In contrast, the belief-based model has failed to prudently explain the effects of feelings and behaviours on attitudes.

2.1.10 Environmental Attitude

Attitudes have been traditionally defined by Allport (1935, p. 810) as 'a mental and neural state of readiness, organised through experience, exerting a directive or dynamic influence upon the individual's response to all objects and situations with which it is related'. However, as time progress, attitudes have been conceptualized and researched in various ways. Eagly and Chaiken (1993:p.1) have defined attitudes as "a psychological tendency that is expressed by evaluating a particular entity with some degree of favour or disfavor". This widely accepted contemporary definition viewed attitude as an evaluative judgement summary of attribute dimensions of a particular

psychological object (Ajzen, 2001; Crano & Prislin, 2006; Eagly & Chaiken, 1993; Eagly & Chaiken, 2005). In simple terms, it is defined as the individual's appraisal of the expected outcomes of the behaviour, that is, a favourable or unfavorable evaluation of the behaviour. Thus, environmental attitude describes an individual's favorable or unfavorable feelings with regard to particular aspects of the environment (Needham, 2010; Newhouse, 1990).

Attitudes are formed from values, beliefs, and evaluations about an object. Values are conceptualized as important standards which serve as guiding principles in a person's life (Rokeach, 1973). Values are distinct from attitudes or beliefs because they function as an organized system and are usually viewed as determinants of attitudes and behaviors (Olson & Zanna, 1993). Ajzen (2001) noted that the evaluation of an object depends on the context and perspective it is being viewed from; thus attitudes are specific to situations, issues, and objects. Researchers in the field of environmental attitudes agree that evaluative judgments are the result of cognitive processes, and the relationship an individual holds between the attitude and valued attributions. As explained by Manfredo, Teel and Bright (2004), the evaluative dimension establishes whether an individual views the object as positive or negative. The cognitive dimension refers to the beliefs that are associated with the object itself.

Attitude is a latent construct and, thus cannot be observed directly. As such, Himmelfarb (1993) suggested that attitude has to be inferred from overt responses rather than being measured directly. Generally, the techniques of attitude measurement can be categorised into direct self-report methods and implicit measurement techniques (Krosnick *et al.*, 2005). The direct self-report method primarily utilizes questionnaires that explicitly ask participants to indicate their own attitudes, and hence may be referred

to as explicit measurement techniques. Implicit measurement technique was developed with the intention to reduce self-presentation biases caused by researchers. This technique includes unobtrusive behavioural observation, physiological measures and response latency measures (Himmelfarb, 1993; Krosnick *et al.*, 2005). Review of previous literature indicated that studies in environmental psychology have depended more on subjective measures such as attitudes and cognitions about the environment, than objective measures such as direct measures and manipulations of objects (Sundstrom *et al.*, 1996). Thus, studies measuring environmental attitude have generally used the direct self-report method which includes interviews and questionnaires, compared to the implicit (observation) techniques (Sundstrom *et al.*, 1996).

In general, research has indicated a positive relationship between environmental attitudes and behaviour. Hines *et al.* (1987) concluded that the relationship is moderate. Through their meta-analytic review of 51 studies of environmental attitude and behaviour relationship, a corrected correlation value of r = .374 was found. The result shows that individuals with a higher level of environmental concern are more likely to involve in activities such as energy conservation, recycling, and petitioning. Hines *et al.* (1987) found that the attitude and behaviour relationship is stronger (.593) among environmental groups compared to samples from general population (r =.328).

2.1.11 Environmental Concern Measurement

Environmental concern has been typically used in empirical literature to refer to environmental attitudes (Dunlap & Jones, 2002; Fransson & Gärling, 1999). Numerous researchers have used "environmental concern" and "environmental attitudes" synonymously (Dunlap & Jones, 2003; Van Liere & Dunlap, 1981). Both Hungerford and Volk (1990) and McGuire (1992) have described environmental concern as an

expressed compassionate perspective of concern for the natural environment, which they considered as a prerequisite to specific environmental attitudes, and intention to act responsibly. As concern for different aspects of the environment develops, feelings of personal responsibility toward environmental protection should also grow. Dunlap and Jones (2002, p.485) have defined environmental concern as 'a segment of environmental attitudes, which refer to the degree to which people are aware of problems regarding the environment and support efforts to solve them and/or indicate a willingness to contribute personally to their solution'

Stern (1992) has explained environmental concern with reference to four identified value orientations. According to the first value orientation, environmental concern signifies a new way of thinking called the New Environmental Paradigm (NEP) (Dunlap & Van Liere, 1978) which relates to an ecocentric system of beliefs (i.e., humans are seen as being part of natural systems). In the second case, environmental concern is related to anthropocentric altruism; whereby people are concerned about environmental quality primarily because they believe that a degraded environment poses a threat to people's health (Black *et al.*, 1985; Hungerford & Volk, 1998; Kollmuss & Agyeman, 2002). The third value orientation relates environmental concern to self-interest, in which perceived personal threats caused by environmental deterioration is an important factor underlying environmentally responsible behaviour (Baldassare & Katz, 1992). The fourth value orientation suggested that environmental concern is a function of some deeper reason, such as underlying religious beliefs or post-materialistic values. However, Gardner and Stern (1996) found that there seems to be a gradual shift among people with the second and third value orientations toward an ecocentric value orientation, which is similar to the NEP worldview. Possessing an ecocentric value orientation implies that one is concerned about the ecosystem for its own sake.

In the context of environmental attitudes, Jackson (1986) proposed that there are two attitudinal groups, ecocentrics and technocentrics. According to O'Riordan (1981, p. 1), ecocentrism advocates the virtues of reverence, humility, responsibility, and care and emphasizes on low impact technology (but is not anti-technology). On the other hand, technocentrism assumed that a human being is absolutely able to understand and control events to suit his purposes. O'Riordan (1981) added that in reality, the dichotomy exists as a continuum with technocentrics on one end and ecocentrics on the other. The region in between is created by Thapa (2000) as dualcentrics, whereby individuals are both moderately ecocentric and moderately technocentric.

Review of environmental attitude literature revealed that there are three widely used measures for environmental attitude. These measures are the Ecology Scale (Maloney & Ward, 1973; Maloney *et al.*, 1975), the Environmental Concern Scale (Weigel & Weigel, 1978), and the New Environmental Paradigm Scale (Dunlap & Van Liere, 1978; Dunlap *et al.*, 2000). With passage of time, the first two scales became obsolete due to the items used in the measurement becoming out-dated. However, the New Environmental Paradigm (NEP) scale does not face this problem as it measures general belief about the relationship of human beings to the environment (Hawcroft & Milfont, 2010).

The NEP was a 12- items scale (8 pro–trait and 4 con–trait) created by Dunlap and Van Liere (1978) to measure the extent to which people would accept the idea of the emerging New Environmental Paradigm worldview. In reviewing several significant studies (Albrecht *et al.*, 1982; Geller & Lasley, 1985; Noe & Snow, 1990; Uysal *et al.*, 1994; Higham *et al.*, 2001; Lück, 2000) testing the NEP scale, Lück (2003) noted that the NEP scale is a reliable scale and a valid tool to measure environmental values.

Nevertheless, all the related research found that the NEP scale is not uni-dimensional, as suggested by Dunlap and Van Liere (1978). All the related studies reported the existence of two to five dimensions for the NEP scale. Thus, Lück (2003) suggested that further research in the dimensionality of NEP is recommended. In relation to this, other studies have revealed that the NEP scale comprises at least three dimensions: balance of nature, limits to growth, and relations with nature (Edgell & Nowell, 1989; Gooch, 1995; Kuhn & Jackson, 1989).

The NEP Scale (1978) was later revised to a 15 items scale and known as a revised NEP scale (Dunlap *et al.*, 1992). The scale was revised by Dunlap and colleagues for two reasons. Firstly, the original NEP Scale was thought to be unbalanced (two of the three factors consisted only pro–trait and one factor consisted only con–trait items). Secondly, some of its items were worded in a sexist fashion (e.g., mankind was used instead of humans). Consequently, the NEP was revised in an attempt to make it more psychometrically sound and avoid obsolete, sexist terminology (Hawcroft & Milfont, 2010). The revised NEP scale has 15 items (8 pro-trait and 7 con-trait), with three items for each of five hypothesized factors of an ecological worldview.

Although the revised NEP scale was hypothesised to have five factors, empirically it produced three factors, that is balance of nature, belief that growth should be limited, and human beings are part of nature (La Trobe & Acott, 2000; Stern *et al.*, 1995; Thapa, 2001) or four factors (Floyd & Noe, 1996). However, the revised NEP scale has been widely utilized as both a single and multi-dimensional scale (Dunlap *et al.*, 2000). Presently, this scale is the most commonly used measure to investigate environmental issues (Salz & Loomis, 2005; Stern *et al.*, 1995) and will be used in the current study as the measurement tool for environmental concern (general environmental attitudes).

2.1.12 Relationship of Environmental Concern and Environmental Attitude and Environmentally Responsible Behaviour

Though numerous studies on environmentally responsible behaviour have been conducted over the decades, discrepancy concerning the extent to which behaviours can be predicted from attitudes and environmental concern still exists. There are some researchers who advocated that attitudes and environmental behaviours are generally analogous with one another (Kraus, 1995), while others disagree (Cottrell, 2003; Gamba & Oskamp, 1994; Manfredo *et al.*, 1992). There are also researchers who embrace the view that the association between environmental attitude-behaviour is weak (Olli *et al.*, 2001).

With regards to this, weak measurement of key variables and other methodological issues were recognised as the reasons for the inconsistencies in findings. Several researchers (Tarrant & Cordell, 1997; Tarrant & Green, 1999; Thapa & Graefe, 2003) have pointed out that the discrepancy of the attitude-environmental behaviour relationship could be caused by: (1) a lack of specificity and congruence between the attitudinal and behavioural measures; (2) these two constructs are not appropriately measured; and, (3) the influence of external factors is not sufficiently taken into account. In order to resolve the first two weaknesses, it was suggested that compatible measurement of recreationists' environmental attitudes and behaviours is required (Bamberg, 2003). To cope with the third weakness, a multifaceted process is required.

Bamberg (2003) further explained that the disappointing explanatory power of the concept of environmental concern, might be resulted from a wrong assumption concerning the causal process through which environmental concern influences specific environmentally related behaviours. Looking back to previous work of Ajzen and Fishbein (1980), they provided strong theoretical and empirical evidence that only

situation-specific cognition is a direct determinant of a specific behaviour. Both Fishbein and Ajzen assumed that general attitudes do not have a direct causal impact on specific behaviours, but an important indirect one. This was supported by Bamberg's (2003) study concerning consumer decision on acquiring information about green electricity products. The author concluded that environmental concern is an important indirect determinant of specific environmental behaviours which operates via its impact on the generation of situation-specific cognition.

In conclusion, the setback for these weak connections between environmental attitudes and behaviours involve the lack of specificity between attitude measures and behaviour measures. There is a need for 'better' conceptualization and operationalization of outdoor recreation, environmental attitudes, and other variables. By measuring attitudes and behaviour at the specific and general level, the aim of this study is to examine if a stronger connection can be found to aid in the development of a stronger and more predictive model to be used for specific activity groups. More specifically, the present study extends previous work in the following ways: (1) use of revised NEP as general attitude measurement to examine the attitude-behaviour relationship in specific recreational activity, which is SCUBA diving, (2) explore and develop a specific attitude measures (diving attitude) in further understanding divers underwater responsible behaviour, (3) examine the predictive ability of general and specific attitude towards specific responsible behaviour in the recreational activity context, and (4) test the mediation influence of diving attitude on the relationship between environment concern and underwater responsible behaviour.

2.1.13 Diving Attitude

As discussed earlier, attitudes are multidimensional, consisting of a number of interrelated constructs. Studies by several researchers have shown that environmental attitude can be represented through the three dimensional perspectives, which refer to the cognitive (knowledge), affective (feelings), and conative (intentions) components (Maloney & Ward, 1973; Maloney *et al.*, 1975; Rosenberg, 1960; Schahn & Holzer, 1990). In essence, the cognitive component of this concept consists of the knowledge facet of an attitude. Personal thoughts and ideas also contribute to this entity. The affective component includes those variables that measure feelings and beliefs about certain issues. The conative component refers to the action or behavioural tendencies of an individual regarding an object. In the present study, specific attitude towards diving is represented based on the three components attitudinal model (McGuire, 1992), which consist of knowledge of specific-issues (cognitive component), awareness of behaviour consequences (belief /affective component), and personal commitment to issue resolution (conative component). Thus, diving attitude can be described as an individual's favorable or unfavorable feelings with regard to particular aspects of the diving environment.

In the diving literature, advanced divers were more inclined to be responsible for their own actions (Thapa *et al.*, 2005). Based on general environmental dispositions, McCawley and Teaff (1995) noted that divers who were concerned about negative environmental impacts had a tendency to be more concerned with preservation and demonstrated more support and understanding for rules and regulations. Many studies have been conducted on examining the general environmental attitude-behaviour relationship in outdoor recreation participation. It appears that none have been conducted specifically to understand the specific attitude-behaviour relationship among

SCUBA divers. Thus, the current study aims to further explore the individual dimensions of diving attitude in relation to the divers' underwater responsible behaviour.

2.1.14 Outdoor Recreation Participation and Environmental Behaviour

Previous studies have indicated that experience in outdoor recreation activity is linked to pro-environmental attitudes and behaviours. The notion of participation in outdoor recreation leads to increased environmental concern and pro-environmental behaviours, has been supported by earlier studies of Dunlap and Heffernan (1975) and others (Tabachnick & Fidell, 1996; Theodori *et al.*, 1998; Valle *et al.*, 2005). In a later study on adolescents, it was shown that experience and involvement in outdoor activities resulted in increased empathy to nature, better social behaviour and higher levels of moral judgment (Palmberg & Kuru, 2000).

Researchers attempting to understand the influence of outdoor experiences on environmental attitudes had uncovered that childhood recreational experiences are good indicators of adult environmental attitudes and behaviours (Clark & Leung, 2007). In a study by Ewert *et al.* (2005) , it was found that adults with changed environmental beliefs are those who participated in outdoor activities as a child and saw abuse of the environment and negative media about it. Ewert *et al.* (2005) highlighted the importance of providing positive outdoor experience for all children, as it has a lasting impact on adult environmental attitudes and behaviours.

Besides, direct outdoor experiences also help people to form bonds with their surroundings and develop place attachment (Ewert & Jamieson, 2003). This feeling of attachment and sense of belonging to a specific outdoor setting would influence individual environmental attitude and behaviours. Likewise, restorative experiences in

nature (e.g. personal feelings of fascination) have been shown to affect pro-environmental behaviours (Hartig *et al.*, 2001).

Dearden *et al.* (2007) have shown that dive experience can cause significant changes in perceptions of diving impacts. The study demonstrated the positive value of 'experience' in changing perceptions, whereby divers' perceptions of the overall impact of diving were significantly more positive after the diving trip. It was found that divers who witnessed the negative impacts of diving were significantly more likely to indicate interest in reef monitoring project following their dive trip than divers who did not see the impacts. This study also confirmed the notion that direct experience is often the most powerful teacher, as advocated by Orams (1995).

2.2 Development of Hypothesis and Research Model

With reference to the review of literature and relevant research works described earlier, it was apparent that there is sufficient support for the consideration of the six variables (experience, personality, environmental concern, diving attitude, subjective norms and personal norms) as antecedents, expected to influence the dependent variable of divers' underwater behaviour. In addition, the present study tried to expand the previous work in a number of ways. From the review of literature, a research model was designed and proposed to address several related issues discussed.

Numerous studies on SCUBA diving have emphasized on impacts of divers' behaviour to the marine environments (Backlund & Williams, 2004; Barker & Roberts, 2004; Haddock & Zanna, 1998; Harriott *et al.*, 1997; Medio *et al.*, 1997; Zakai & Chadwick-Furman, 2002). However, limited studies were performed to investigate the antecedents

affecting divers' underwater responsible behaviours. Understanding the influence of personal 'social psychological' variables on divers' underwater behaviour is still relatively unexplored and much desired. In explaining environmental behaviour, it was acknowledged that the socio-psychological factors such as the constructs of values, attitudes, and beliefs, habits, personal capabilities have shown better results than other socio-demographic factors (Haddock & Zanna, 1998; Salz & Loomis, 2005; Hunecke *et al.*, 2007).

Experience of divers has been one of the personal construct being examined and associated with divers' underwater behaviour in many SCUBA diving studies. While several studies (Musa *et al.*, 2011; Ramanaiah *et al.*, 2000; Talge, 1992; Roberts & Harriott, 1995) have indicated that significant correlation between experience level and underwater behaviour exists among divers, some researchers found otherwise (Rouphael & Inglis, 2001). Hence, there is a discrepancy regarding the relationship between experience level and divers' underwater behaviour, which need to be elucidated.

Evidence from psychology literature showed that personality positively influence environmental behaviour in various consumer behaviour studies (Balderjahn, 1988; Fraj & Martinez, 2003; Ramanaiah *et al.*, 2000). However, literature in examining the relationship between underwater responsible behaviour and personality traits among SCUBA divers is almost non-existence with the exception of Musa *et al.* (2011). With the purpose to ascertain its role in influencing divers' underwater behaviour, personality traits have been considered as one of the antecedents influencing divers' underwater behaviour in this study.

Researchers have been concerned with individuals' beliefs, attitudes, and worldviews (i.e. environmental concern) that are believed to be a major factor for influencing

individual pro-environmental behaviour. It has been noted that attitudes predispose behaviours (Stern *et al.*, 1995). The association between attitudes and behaviours has been examined using numerous behavioural models that tried to show how attitudes are antecedents to behaviour. At a general level, environmental attitude/concern has been found to be positively correlated with environmentally responsible behaviours (Backlund & Williams, 2004; Schultz & Zelezny, 1998; Tarrant & Cordell, 1997) (Blake *et al.*, 1997). However, weak or modest relationships were commonly found with respect to attitude-behaviour association (Cottrell, 2003; Scott & Godbey, 1994; Tarrant & Cordell, 1997; Thapa, 1999; Thapa, 2000). As reminded by Thapa (2010), 'it is important to assess recreationists' general environmental consciousness as well as attitudes and behaviours toward site-specific issues to promote environmental stewardship in the outdoors' (p.134). Nevertheless, a line of inquiry concerning the strength of association between environmental concern and specific issue of divers' underwater behaviour has yet to be established. Thus, the present study aimed to further investigate the influence of environmental concern as an antecedent to the divers' underwater behaviour.

The current study seeks to justify the importance of three personal variables in relation to divers' underwater behaviour: experience, personality, and environmental attitude. The in-depth understanding of the relationship between these variables and environmental responsible behaviour can lead to the planning and provision of improved policy and educational programs to enhance SCUBA divers' responsible behaviour while diving underwater. In relation to the issue discussed, the study hypothesized that:

H1a: Experience level has a significant relationship with divers' underwater responsible behaviour

H1b: Personality has a significant relationship with divers' underwater responsible behaviour

H1c: Environmental concern has a significant relationship with divers' underwater responsible behaviour

Previous studies have indicated the weak predictability of the attitude-behaviour relationship was caused by attitude specificity and attitude measurement (Tarrant & Cordell, 1997; Tarrant & Green, 1999; Thapa & Graefe, 2003). In response to these issues, the present study aimed to further examine the relationship with the enhancement in methodology and operationalization of attitude construct. Diving attitude was introduced and operationalized as a multi-dimensional construct representing specific attitude. This exploratory attempt would untangle the problem of specificity and provide a more comprehensive understanding on the influence of specific attitude on divers' underwater responsible behaviour. In relation to the subject, the study hypothesized that:

H2: Diving attitude has a significant relationship with underwater behaviour of divers

Among the existing diving literature, it seems that there was an absence of studies that employed specific diving attitude as an antecedent and examine its mediator role in explaining divers' behaviour. With the intention of achieving better behavioural predictability, the mediator role of diving attitude is further pursued.

With regards to environmental concern, pro-environmental behaviour studies using rational-choice approaches (TPB) has shown that it is an important indirect determinant of specific environmental behaviour. Bamberg (2003) indicated that environmental concern had a direct influence on the evaluation of situation-specific cognitions, but not a direct effect on intention or behaviour. In the present study, this would imply that there is an indirect relationship between environmental concern and divers' underwater behaviour, with the existence of diving attitude as a mediator.

Based on previous studies, personality traits and external demographic constructs were found to influence behaviour indirectly through attitude (Courneya *et al.*, 1999). This indicated that there are possibilities that the relationship between personality and experience with divers' underwater behaviour are mediated by their diving attitude.

As discussed, empirical evidences to support the mediator role of specific attitude between the personal factors (experience, personality, and environmental concern) and specific behaviour were very limited. More importantly, it has never been tested in the context of SCUBA diving activity. To close this gap, the present study further explored the mediating role of diving attitude with the following hypotheses:

H3a: Diving attitude mediates the relationship between experience level and underwater behaviour of divers

H3b: Diving attitude mediates the relationship between personality and underwater behaviour of divers

H3c: Diving attitude mediates the relationship between environment concern and underwater behaviour of divers

Stern (2000) has advocated the concept of coherent theory to examine pro-environmental behaviour. Among existing pro-environmental behaviour studies that involved coherent theory are, travel mode choice (Hunecke *et al.*, 2001; Wall *et al.*, 2007), car usage (Bamberg & Schmidt, 2003), environmental conservation (Saunders, 2003) and recycling (Oom Do Valle *et al.*, 2005). However, the application of Stern's coherent theory in explaining environmental behaviour among recreationists is still lacking. As noted by Ziman (1991, p. 3), "the goal of science is a consensus of rational opinion". Thus, it seems reasonable to build consensus by applying recognized theories in new settings, such as in outdoor recreation setting. In response to this, the current study attempted to integrate variables from TRA and NAT to further understand the pro-environmental behaviour in the specific context of SCUBA diving.

Oom Do Valle *et al*. (2005, p. 370) pointed out that 'theories of comparable concepts can be integrated to better predict environmental behaviour'. Wall, Wright and Mill (2007) have suggested that 'it is more appropriate to combine the variables because of their differences rather than because of similarities'. Thus, related variables from both theories such as attitude, subjective norms and personal norms were included for detail examination in the study. Literature indicated that the predictors of general environmental behaviour have documented some degree of relationship between attitude, subjective norms, and personal norms (Armitage & Conner, 2001; Harland *et al.*, 1999; Oom Do Valle *et al.*, 2005). To date, these relationships are yet to be examined in the context of SCUBA diving activity. The relationship of subjective norms and personal norms, and their explanatory power towards divers' underwater behaviour remain unclear. Thus, subjective norms and personal norms are two additional antecedents to be investigated in the present study. With regards to this, the following hypotheses were formulated:

H4: Subjective norms have a significant relationship with underwater responsible behaviour

H5: Personal norms have a significant relationship with underwater behaviour of divers

In line with Schwartz's (1977) NAT model of altruistic behaviour, it was explained that the influence of social/subjective norms on the individual behaviour is not direct. Instead, it is mediated by personal norms of altruistic behaviour. Previous studies have indicated that personal norms act as mediator in the relationship between social norms and recycling behaviour (Oskamp *et al.*, 1991; Vining & Ebreo, 1992). However, the mediator role of personal norms on the relationship between subjective norms and specific environmental behaviour in the recreation setting is yet to be verified. To address the subject matter, the following hypothesis is forwarded.

H6: Personal norms mediate the relationship between subjective norms and underwater behaviour of divers

From the above discussion and literature review, a research model was developed as shown in Figure 2.3. The model consists of six independent variables which were represented by experience, personality, environmental concern, diving attitude, subjective norms and personal norms. These antecedents were expected to influence the dependent variable, which is divers' underwater behaviour. The model also considers the mediating roles of diving attitude and personal norms in the relationship among the variables, providing detailed explanation of the issues of divers' underwater behaviour.

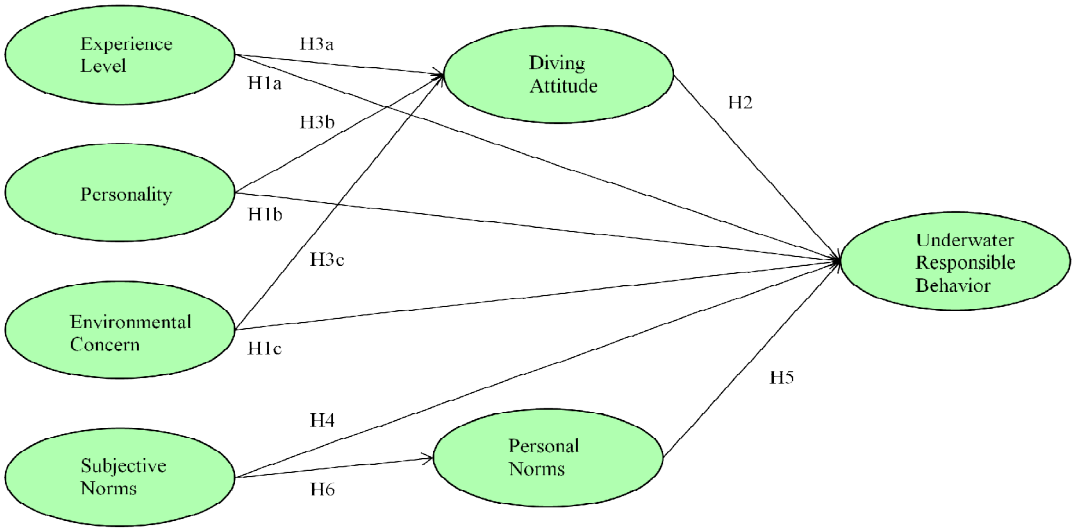

Figure 2.3: The Model of Divers' Underwater Responsible Behaviour

2.3 Summary

This chapter has presented an overview of environmental responsible behaviour studies, coupled with an explanation of the related framework and behavioural theories involved. The possibility of the application of coherent theory (Stern, 2000) in explaining environmental behaviour in the outdoor recreation setting was examined, and discussed with the combination of variables from TRA and NAT. Following that, divers' underwater behaviour which represented the specific environmental behaviour was elaborated.

Many studies in SCUBA diving have focused on impacts of divers' behaviour on the marine environment, neglecting the question of 'what?' causes negative behaviour of divers while diving. The main concern of the study was to search for prominent antecedents that may be appropriate to be emphasized in enhancing responsible underwater behaviour among divers while diving. Therefore, literatures regarding pertinent personal socio-psychological factors such as experience, personality, environmental attitude were presented. The discrepancy concerning the attitude-

behaviour relationship and its measurement was highlighted and discussed. Consequently, the discussion led to the formulation of hypotheses for the current study and the development of a divers' underwater behaviour model to be tested.

Reviewing previous literature indicated that examining the antecedents of divers' underwater responsible behaviour is worthy of further study. Past studies in environmental behaviour among outdoor recreationists have been carried out mainly in terrestrial settings. However, there has been limited work on the investigation of responsible underwater behaviour among divers in the marine environment. The following chapter therefore outlines the methods utilised to examine the pertinent antecedents in explaining underwater responsible behaviour among divers diving in the Malaysian waters.

CHAPTER 3: METHODOLOGY

3.0 Introduction

The purpose of this chapter is to outline the research design for conducting this study and the methodological procedures that would be used to test the overall proposed model. Specifically, the chapter focuses on the following main areas: (a) type of research to be conducted; b) sampling method; c) the development of the questionnaire that would be used to measure the independent and dependent variables of the proposed model, d) data collection procedures; (e) the methods involved in testing the validity and reliability of the variables, and (f) the methods used to examine the fit of the model with the collected data. Structural equation modeling allows the proposed relationship to be tested simultaneously and reduces the likelihood of chance findings due to measurement error (Joreskorg & Sorbom, 1996). Besides, it enables the psychometric characteristics of the individual independent and dependent variables to be evaluated.

3.1 Research Design

As described by Kumar (2005), the typology of research can be viewed from three perspectives: application, objectives and the types of information sought. From the perspective of the type of information sought, research activity can be classified as qualitative or quantitative. The differentiation between qualitative research and quantitative research can be identified through three criteria which are the purpose of the study, measurement of variables and how the information is analyzed.

In the case of qualitative research, the purpose of study would primarily be to describe a situation, phenomenon, problems or events. To establish the variation in situation, phenomenon or problem, a descriptive analysis approach would often be used without statistically quantifying it (Kumar, 1999). According to Strauss and Corbin (1998), qualitative research is often being interpreted as any kind of research that produces findings not arrived at by means of statistical procedures or other means of quantification. Besides, Denzin and Lincoln (2000) highlighted that qualitative research involves an interpretive and naturalistic approach. They explained that 'qualitative researchers study things in their natural settings, attempting to make sense of, or to interpret, phenomena in terms of the meanings people bring to them" (p. 3). Myers (2000) added that the main objective of qualitative research is to offer a perspective of a situation and provide well-written research reports that illustrate the related phenomenon. Qualitative research approaches enable the researcher to gain deeper meaning and more specific information regarding an individual's experience. It involves verbal reports, descriptions, and interpretations rather than numbers or traditional statistical analysis. Although qualitative approaches allow for more in-depth research, the ambiguous nature of data analysis presents a rather large disadvantage (Gordon & Langmaid, 1988).

Creswell (1994) defined quantitative research as a type of research that explains phenomena by collecting numerical data that are analyzed using mathematically based methods (in particular statistics). Quantitative research is concerned with the collection and analysis of data in numeric form. It tends to emphasize relatively large-scale and representative sets of data (Blaxter *et al.*, 1996). Gordon and Langmaid (1988)noted that the advantages of using quantitative data are that numerical data is easy to collect, code, summarise and analyse. Though quantitative approaches allow researchers to gain a

broad understanding of the average participant experience, it lacks the ability to determine in-depth insights.

Fundamentally, two different worldviews underlie quantitative and qualitative research. The quantitative view is described as being `realist' or sometimes `positivist', while the worldview underlying qualitative research is viewed as being `subjectivist' (Sukamolson, 2007). In terms of epistemological assumptions, researchers in the quantitative research are independent from that being researched, whereas researcher interacts with that being researched in the qualitative research. A comparison of qualitative and quantitative approaches is as shown in the Table 3.1 below (Creswell, 2009):

Table 3.1: A Comparison of Quantitative and Qualitative Approaches

	Qualitative Approaches	Quantitative approaches
Philosophical Assumptions	Constructivist/ advocacy/ participatory knowledge claims	Post-positivist knowledge claims
Strategies of inquiry	Phenomenology Grounded theory Ethnography Case study Narrative	Surveys Experiments
Methods employed	Open-ended questions Emerging approaches Text or image data	Closed-ended questions Predetermined approaches Numeric data
Practises use by researcher	Positions him- or herself Collects participant meanings Focuses on a single concept or phenomenon Brings personal values into the study Studies the context or setting of participants Validates the accuracy of findings Makes interpretations of the data Creates an agenda for change or reform Collaborates with the participants	Tests or verifies theories or explanations Identifies variables to study Relates variables in questions or hypotheses Uses standards of validity and reliability Observes and measures information numerically Uses unbiased approaches Employs statistical procedures

Source: Creswell (2009)

With the purpose to examine the influence of selected antecedents on divers'underwater behaviour, the current study would utilise empirical numerical data and statistical analysis (SEM) technique. Thus, a quantitative research approach was considered more appropriate for the current study. According to Baumgartner and Hensley (2006), quantitative research involves the collection of numerical data in order to describe phenomena, investigate relationship between variables, and explore cause–and-effect relationships of phenomena of interest. Hence, it uses objective measurement and statistical analysis of numeric data to derive conclusions in explaining phenomena. Quantitative research can further be categorized as either experimental or non-experimental. Experimental research involves the manipulation of one variable on another variable. In the case of non-experimental research, it is concerned with relationships among variables, but does not manipulate them. Mainly, there are three types of non-experimental research which consists of: a) correlational research; b) causal comparative research; and c) survey research. After considering numerous research designs, it was decided that the use of a quantitative survey would be most appropriate to achieve the research objectives. The present study utilised the survey research method which involves the use of questionnaires. As explained by Salkind (2000), survey research can present a broad picture of the subject being studied and provides an easy way to generalize a population.

3.1.1 Survey Research

Survey research is recognised as a structured approach to data collection and it follows a particular logic of analysis (de Vaus, 2002). It is commonly regarded as a quantitative research method that provides certain factual, descriptive information. In survey research, information concerning opinions or practices is acquired from a sample of people that represents a population of interest, utilizing interviews or questionnaire

techniques. The obtained information would be used as a basis for comparisons and determining trends, to describe the attitudes, opinions, behaviors, or characteristics of the population, and provide information for decision making (Baumgartner & Hensley, 2006).

In relation to this, the choice of using quantitative survey approach was decided based on past literature, in which several studies have examined environmental attitudes and behaviours through the use of quantitative techniques (Cottrell, 2003; Gamba & Oskamp, 1994; Kraus, 1995; Manfredo *et al.*, 1992; Olli *et al.*, 2001). For example, the use of revised New Environmental Paradigm (NEP) as a quantitative assessment tool, is one of the most widely used methods of evaluating environmental concern (Dunlap *et al.*, 2000). In addition, utilising a quantitative technique allows for the direct comparison of research results with previous environmental attitude and behaviour research findings. The present research sought to examine a group of individuals and not specific individuals. Therefore the use of a quantitative survey is most appropriate. The advantages of survey research include the establishment of standardised data allowing easy comparison (Saunders *et al.*, 1997), and the ability to economically examine large groups in relatively short periods of time (Kraus & Allen, 1998).

As with any research method, there are always the pros and cons. In this regard, Miller (2004) has highlighted the following advantages of survey research: a) its ability to collect a wide scope of information and describe the characteristics of a large population; b) data collected in the real situation is capable of reflecting the actual situation of the issue under investigation; and c) it offers a first stage in developing hypotheses or in identifying more precise problems for research. On the other hand, a few of the disadvantages in survey research are: a) it is more extensive than intensive, in the sense

that it does not dwell further to discover profound issues below the surface; b) can be financial and temporally demanding; and c) lacks external validity (Miller, 2004).

All types of research have its disadvantages and limitations. To minimise these shortcomings, employing the most appropriate methodology is vital. Therefore this research utilises a quantitative survey to capitalize on the advantages of quantitative approach while also considering its suitability to the research objective.

3.1.1a Cross –Sectional Survey Research

The present study utilized a cross-sectional approach. This method is used to test different groups of people who differ in the variable of interest, and focused on finding relationship between variables, with the assumption that each group is representative of all other groups at a particular point in time (Baumgartner & Hensley, 2006, p.181). Salkind (2000) discussed various advantages and disadvantages for employing this type of approach. The advantages for using cross-sectional survey research include: a) it is rather inexpensive; b) the study can be accomplished in a short-time span; c) there is a low-rate of subjects who quit the study; and d) it does not involve long-term administration or cooperation between staff and participants. The disadvantages identified are: a) it is unable to reveal the continuity of development on a person-by person case; b) it does not reveal the direction of changes that may take place in a group, thus limits the comparability of groups c) it examines people of the same chronological age who may be of different maturational ages (p.202).

Comparatively, the advantages seem to prevail over the disadvantages for using cross-sectional survey research. Thus, for the purpose of the current study, a cross-sectional survey research is employed.

3.1.1b Sampling

Sampling is the process of selecting a sample from a bigger group (the sampling population) to become the basis for estimating or predicting a fact, situation or outcome of the bigger group (Kumar, 1999). A sample is a sub-group of the population in which the study is interested in. Thus, the sample, sample size and sampling unit are presented below.

Sample

Since the target population is SCUBA divers diving in Malaysian dive sites, the sample was made up of only certified SCUBA divers, aged 18 years old and above who were involved in SCUBA diving activity on the Malaysian islands. Data were collected on sites at diving centres or resorts on the selected Malaysian islands.

Sample Size

In most surveys, access to the entire population is almost always impossible. However, the results from a survey with a carefully selected sample could reflect closely those that would have been obtained from the population providing the data. The sample size, in this case, refers to the number of divers to be included in the survey.

To determine the appropriate sample size, three criteria usually will need to be specified: the level of precision, the level of confidence or risk, and the degree of variability in the attributes being measured (Miaoulis & Michener, 1976). The level of precision, also known as sampling error, is the range in which the true value of the population is estimated. This range is often expressed in percentage points (e.g., ±5 percent). The confidence or risk level is based on ideas encompassed under the Central Limit Theorem. In a normal distribution, approximately 95% of the sample values are within

two standard deviations of the true population value (e.g., mean). This means that, if a 95% confidence level is selected, 95 out of 100 samples will have the true population value within the range of precision specified earlier. The degree of variability in the attributes being measured refers to the distribution of attributes in the population. The more heterogeneous a population, the larger the sample size required to obtain a given level of precision. This also means that, the more homogeneous a population, the smaller the sample size.

Generally, two of the three criteria – the level of precision and the level of confidence are usually pre-determined. The degree of variability must be estimated in order to complete the sample size determination. This can be estimated in three ways: using pilot studies, relevant literature and rule-of-thumb estimates. Comparatively, the most accurate determination of sample size is obtained when the investigator has collected relevant data from a pilot or small-scale preliminary study, in which an estimate of attribute variability can be made. This procedure is considered one of the best ways to determine sample size (Statistical Consulting Group, 2006).

There are several approaches to determining the sample size. These include using a census for small populations, imitating a sample size of similar studies, using published tables, and applying formulas to calculate a sample size (Israel, 1992). Comparatively, application of formulas enable flexible and better calculation of the necessary sample size for a different combination in levels of precision, confidence, and variability.

In the formula application technique, there are two methods to determine sample size for variables that are polytomous or continuous. One method is to combine responses into two categories and then use a sample size based on proportion (Smith, 1983). The

second method is to use the formula of the sample size for the mean. The present study employs the formula of the sample size for the mean, because the conducted pilot study could provide the measures of variability. This method is also considered as a more accurate procedure in sample size determination.

The formula of sample size for the mean is as shown below (Dell *et al.*, 2002):

Formula: $n = \frac{t^2 \times \sigma^2}{m^2}$

Description:

n = required sample size, t = confidence level, m = margin of error,
σ^2 = variance of attribute from pilot study;

For the present study, the sample size is calculated as:

Calculation: $n = \frac{1.96^2 \times .51^2}{.05^2}$

Description:

n = required sample size
t = confidence level at 95% (standard value of 1.96)
σ^2 = variance of underwater behaviour obtained from pilot study (Std. Dev. = .51)
m = margin of error at 5% (standard value of 0.05)

$n = \frac{3.8416 \times .26}{.0025}$

$n = \frac{.9988}{.0025}$

$n = 399.52 \approx \underline{400}$

The sample size formulas provide the number of responses that need to be obtained. As suggested by many researchers, the sample size also is often increased by 30% to compensate for non-responses (Israel, 1992). Therefore, total responses needed were increased to 520, with an additional of 120 (400 X .30 = 120) responses.

Sampling Unit

There are a total of 58 dive centres operating on five major diving islands in both Peninsula Malaysia and East Malaysia ("Malaysian Underwater Association.," 2009). These major SCUBA diving islands are Pulau Langkawi, Pulau Perhentian, Pulau Tioman and Pulau Redang (Peninsula Malaysia) and Pulau Mabul/Sipadan (East Malaysia). Based on information from dive centres' operators, there was an estimated population of 88,500 divers visiting these islands in the year of 2009.

Idealistically, the selection of samples was made based on a complete listing of all divers visiting the islands. As there is no record of the population list, it is impossible to assign known probability of selection to all the units of the population. Alternatively, a non-probability sample design such as quota sampling could be adopted. This is the most widely used sample design in market research, in opinion polls and social sciences research (Corbetta, 2003). Quota sampling resembles stratified sampling, but with the choice of the units left to the researcher. However, the size of the quota limits this freedom of choice and ensures that the overall sample reproduces the population distribution in regards to the variables on which the quotas are based (Corbetta, 2003). In other words, the quota ensures that the composition of the sample is the same as the composition of the population with respect to the characteristics of interest.

In the present study, a geographical quota sampling approach was applied for deciding the strata sample size. Population was subdivided into five geographical stratas according to the five islands. The 'proportional' weight of each stratum was calculated based on the ratio of numbers of dive centres on each islands compared to the total overall numbers of dive centres, which is 58 (assuming each dive centres having equal numbers of visiting divers annually). Finally, the quotas (the numbers of respondents

needed in each stratum) were established by multiplying these weights by the calculated sample size. The calculation of quotas is as follows:

Table 3.2: Calculation of Quota Sample Size

Island	Dive centres (DC)	Weights (DC/Total DC)	Quota (weight X sample size)	No. of responses
Pulau Tioman	16	16/58 =.276	.276 X 520 = 143.4	143
Pulau Redang	7	7/58 =.121	.121 X 520 = 62.9	63
Pulau Perhentian	19	19/58 =.328	.328 X 520 = 170.6	171
Pulau Langkawi	5	5/58 = .086	.086 X 520 = 44.8	45
Semporna/Mabul	11	11/58 =.189	.189 X 520 = 98.3	98
Total				520

To avoid the biasness of dive centres selection, fifty percent (50%) of the dive centres on each island was then, randomly selected by 'fishbowl' method, with reference to the list of dive centres from the Malaysia Underwater Association (2009). 'Fishbowl' method is a simple random sampling technique whereby each member of a population has an equal opportunity to become part of the sample. In this case, name of the dive centres on each island was written on pieces of paper and drawn from a box; the process was repeated until the sample size was reached. Consequently, a total of twenty nine (29) dive centers (23 from Peninsular Malaysia and 6 from East Malaysia) were identified and visited. Since the targeted sampling frame of the research was SCUBA divers who visited Malaysian dive sites, a purposive sampling technique was adopted.

The purposive sampling technique involves selecting participants who possessed specific characteristics or traits which are critical to the result of the investigation (Baumgartner & Hensley, 2006). As noted by Babbie (2001), this type of technique is acceptable for general comparative purposes, but care must be taken when making statistical generalizations beyond the surveyed population. In the current study,

respondents were selected by means of their participation in SCUBA diving activity at the dive centres.

3.1.2 Data Collection

Data were collected from SCUBA divers (both domestic and foreign), visiting the five most popular SCUBA diving islands (i.e. four islands from Peninsula Malaysia and one island from East Malaysia) during the diving season from the months of May – September 2009. The five major SCUBA diving islands were Pulau Langkawi, Pulau Perhentian, Pulau Tioman and Pulau Redang (Peninsula Malaysia) and Pulau Mabul/Sipadan (East Malaysia). On average, eighteen (18) self-administered questionnaires were distributed to SCUBA divers in each of the twenty nine selected dive centres. During resting period at dive centres, questionnaires were distributed to divers (respondents) with the assistance of dive instructors. No time limit was placed on the respondents to complete the inventory. The data were collected by the researcher who stayed on the islands over a period of seven to ten days. With the permission of the dive instructors at selected dive centres, the researcher approached the divers who were resting on-site. After a brief explanation regarding the purpose of the study, questionnaires were distributed to divers who agreed to voluntarily involve in the study. The choice of divers at dive centre was carried out with convenience sampling.

As noted by Mitchell and Jolley (2006), self-administered questionnaires have the advantages of: being easily distributed to a large number of people, able to cover wide geographical locations, economical, and allow anonymity which helps in getting honest answers from respondents. However, one of the drawbacks of this method is the absence of the researcher to assist in clarifying ambiguous questions encountered by the respondents. To minimize this drawback, the researcher was present in the vicinity of

the dive centres to assist on any problems encountered by respondents. A total of 58 divers declined to be involved in the study, which resulted in a non-response rate of 11.2%. Consequently, this produced a response rate of 88.8% (462). High response rate was achieved as divers were in a captive environment and the researcher was present on-site to facilitate the completion of the questionnaires. However, due to incomplete/spoiled questionnaires and data cleaning process (49), only 413 questionnaires were used in final analysis (79.4% usable rate).

3.1.2a Questionnaire

An eight-page questionnaire was developed, designed, and produced as a double-sided booklet (Appendix B). The front page was a covering letter, providing brief information concerning the purpose of the research project. Respondents were invited to participate in the survey voluntarily and their anonymity was assured. Estimated time (10-15 minutes) required to complete the survey was also printed on the cover page.

The questionnaire consists of eight sections. The first section contains several demographic questions whereby, respondents were asked to provide information regarding their gender, nationality, marital status, age, and education level. The second section consists of three items concerning experience level. The third section comprises of 25 items measuring the five types of personality traits. The fourth section deals with the measurement of underwater responsible behaviour with 14 items, covering three dimensions of safety diving behaviour, skill diving behaviour and non-contact diving behaviour. The fifth section comprises 15 items measuring diving attitude. The sixth section measures subjective norms with 3 items. The seventh section measures environmental concern with the 15-item scale of NEP. The last section consists of 3 items which measure personal norms. A blank space was provided at the end of the

questionnaire, requesting respondents to voluntarily provide any comments or suggestions pertaining to the questionnaire or research project.

3.2 Instrumentation

In the current study, three types of variables were observed. They were independent, dependent and mediating variables. Within the context of the current study, independent variables are those variables which are not influenced by any other variable. On the contrary, a dependent variable is defined as one that is influenced by another variable in the study framework. Meanwhile, mediating variables are the connecting variables that transfer the effect of independent variables to the dependent variable. The independent variables in the present study are: a) Experience level; b) Personality; c) Environmental concern; and d) subjective norms. The dependent variable in the model is divers' underwater behaviour, whereas the mediating variables are: a) Diving attitude and b) Personal norms.

3.2.1 Measurement of Constructs

The scales used to measure the related variables in the present study were conceptualized and discussed in the following section. Some of the scales were adopted or adapted from existing measures, which have been found to be valid and adequately reliable. Some were modified to reflect the nature of the current study. The measures of diving attitude and diver's underwater behaviour were self-developed based on previous related literature. A summary of all the constructs are presented in Table 3.3.

Table 3.3: Summary of constructs

Construct/ Construct label	Construct definition	Source of reference	No. of items used in the pilot study	No. of items used in final study
Experience level (EXP)	the amount and the extent of participation an individual has in SCUBA diving activity	Todd (2000); Thapa *et al.* (2006); Musa *et al.* (2006).	5	3
Personality (PSN)	a dynamic and organized set of characteristics possessed by a person that uniquely influences his/her cognitions, motivations and behaviours in various situations	ipip.ori.org/new NEO Domains	25	25
Environment concern (ENC)	general attitudes toward ecology and the environment as a whole	Dunlap *et al.* (2000); Thapa (2010)	15	15
Subjective norms (SN)	beliefs about what others (family members, friends, neighbours, or social groups) will think about the related behaviour	Oom Do Valle *et al.* (2005)	3	3
Underwater behaviour (UWB)	specific responsible behaviour exhibited by divers towards both own safety / health and the protection of marine environment, while diving underwater.	Thapa *et al.* (2006); Todd (2000); Department of Marine Park, Malaysia (2009)	20	14
Diving attitude (DAT)	an individual's favorable or unfavorable feelings with regard to particular aspects of the diving environment	Department of Marine Parks, Malaysia (2009); Coral Reef Alliance (2009)	15	15
Personal norms (PN)	an individual's conviction or belief that acting in a certain way is right or wrong	Oom Do Valle *et al.* (2005)	3	3

3.2.1a Independent Variables

Experience level (EXP)

For the purpose of this study, experience level is defined as the amount and the extent of participation an individual has in SCUBA diving activity, which also comprises related knowledge and skill in SCUBA diving. With reference to the experience use history (EUH) concept and specialization theory, five items were generated to represent the experience level construct. These questions were adapted from several SCUBA diving studies conducted by Todd (2000), Thapa *et al.* (2006) and Musa *et al.* (2006), which were found to be common in representing experience level. In Thapa *et al.*'s (2006) study, the reliability of these items representing the behavioural domain and cognitive domain were found to have Cronbach's alpha value of .68 and .89 respectively. In relation to specialization concept, three items ('How long have you been involved in SCUBA diving activity?', 'To date, how many dives have you made?' and 'On average, how often do you dive in a year?') were related to the behavioural domain. Another two items ('What is your level of SCUBA diving certification?' and 'How would you rate yourself as a SCUBA diver?') were associated to cognitive dimension, which represents skill and knowledge of divers. Each of the diving experience items was allotted with five choices respectively. Each parameter of diving experience was given scores from 1 to 5, which would then be totalled up to indicate the experience level. The total experience score ranged from the lowest of 3 to the highest of 15. Divers were divided into three groups: lowest experience (3 to 6), moderate experience (7 to 10) and highest experience (11 to 15). However, two items (EXP4 and EXP5) were discarded after the pilot study.

Table 3.4: Experience Level Measurement

	Items
	How long have you been involved in SCUBA diving activity?
EXP1	To date, how many dives have you made?
EXP2	What is your level of SCUBA diving certification?
EXP3	How would you rate yourself as a SCUBA diver?
EXP4	How long have you been involved in SCUBA diving activity?
EXP5	On average, how often do you dive in a year?

Sources: Todd (2000); Thapa *et al.* (2006); Musa *et al.* (2006).

Personality (PSN)

Personality is defined as a dynamic and organized set of characteristics possessed by a person that uniquely influences his/her cognitions, motivations and behaviours in various situations (Petty *et al.*, 1981). The dispositional personality perspective describes personality as made up of physiologically based traits, which guide behaviour. Traits can be described as tendencies to behave and react in a specific way.

The Five Factor Model (FFM) (McCrae & John, 1992) is a version of trait theory that views human nature from the perspective of consistent and enduring individual differences. It depicts an example of fundamental structure of the individual differences. As noted by John and Srivastava (1999), the model structure has generalized across cultures, sources of ratings, and measures. It has been shown that the validity of the NEO PI-R is not threatened by socially desirable responding (Costa & McCrae, 1992, p. 42). Therefore, the present study has chosen the Big Five Factor Structure scale for its established properties and also because it is reliable and stable with time (Fraj & Martinez, 2006).

Personality was tested based on measurement derived from 50-items set of IPIP (International Personality Item Pool) scales developed to measure the five NEO-PI-R (NEO Personality Inventory- Revised version) domains (Costa & McCrae, 1992). The NEO PI-R is a well-established personality test based on the five-factor model of personality. This model states that the basic trait dimensions in human personality are neuroticism, extraversion, openness to experience, agreeableness and conscientiousness (Costa & McCrae, 1992).

In the present study, 25-items were used instead of the full-50 items to avoid respondent fatigue (Liljander *et al.*, 2006). Each of the five personality dimensions was measured by 5 items, which made a total of 25 items. The five items representing each dimension were chosen with reference to previous research on the comparative studies of 100-items and 50-items IPIP scale (Guenole & Chernyshenko, 2005; Gow *et al.*, 2005). In both studies, 50-item IPIP scale was found to be highly consistence with the 100-item IPIP scale, whereby only six out of fifty items were found to be inconsistence (biased). These inconsistence items were preliminary excluded from the questionnaire. Further observation showed that all the five positively worded items for extraversion, openness to experience, agreeableness and conscientiousness and five negatively worded items for neuroticism were indicating high consistency in the comparative studies. Consequently, all the items from each dimension were positively worded except five items for neuroticism which were negatively worded. Participants rated each item on a 5-point scale ranging from 1 (very inaccurate) to 5 (very accurate). The scores of the 5 items which measure each trait were summarized, and each respondent obtained a raw score of each of the personality traits. In the questionnaire development process, the items were further discussed by panel of experts (academic colleagues) regarding their applicability and relevance.

Table 3.5: Personality Measurement

Dimensions	Code	Items
Agreeableness	AG1	I respect others
	AG2	I have a good word for everyone
	AG3	I accept people as they are
	AG4	I believe that others have good intentions
	AG5	I make people feel at ease
Extraversion	EX1	I make friends easily
	EX2	I know how to captivate people
	EX3	I am skilled in handling social situations
	EX4	I feel comfortable around people
	EX5	I am normally the life in a party
Conscientiousness	CN1	I am always prepared
	CN2	I get chores done right away
	CN3	I carry out my plans
	CN4	I make plans and stick to them
	CN5	I pay attention to details
Neuroticism	NU1	I rarely get irritated
	NU2	I feel comfortable with myself
	NU3	I seldom feel blue
	NU4	I am not easily bothered by things
	NU5	I am very pleased with myself
Openness to experience	OP1	I have a vivid/strong imagination
	OP2	I carry the conversation to a higher level
	OP3	I enjoy hearing new ideas
	OP4	I feel comfortable around people
	OP5	I tend to vote for liberal political candidates

Source: ipip.ori.org/new NEO Domains

In terms of reliability, Cronbach's alpha value (α) for each of the dimension in the original 50-items scales, were neuroticism, α = 0.86; extraversion, α = 0.86; openness to experience, α = 0.82; agreeableness, α = 0.77; and conscientiousness, α = 0.81. In Musa *et al.*'s (2011) study on personality of divers, using four items representing each

dimension, the reliability for each dimension was found to be: neuroticism $\alpha = 0.81$; extraversion, $\alpha = 0.85$; openness to experience, $\alpha = 0.81$; agreeableness, $\alpha = 0.86$; and conscientiousness, $\alpha = 0.84$.

Environmental concern (ENC)

Environmental concern is commonly being referred to as general environmental attitudes (Dunlap & Jones, 2002; Fransson & Gärling, 1999). Both Hungerford and Volk (1990) and McGuire (1992) have described environmental concern as an expressed compassionate perspective of concern for the natural environment. For the purpose of this study, environmental concern is referred to as 'a segment of environmental attitudes, which refer to the degree to which people are aware of problems regarding the environment and support efforts to solve them and/or indicate a willingness to contribute personally to their solution' (Dunlap & Jones 2002, p.485).

Environmental concern was operationalized using New Ecological Paradigm (NEP) Scale (Dunlap *et al.*, 2000), which consists of 15 items. The scale is a revision of the original 12-item NEP (New Environmental Paradigm) scale (Dunlap & Van Liere, 1978) conceptually based upon five dimensions: (1) reality of limits to growth; (2) anti-anthropocentrism; (3) fragility of nature's balance; (4) rejection of exemptionalism; and (5) possibility of an ecocrisis or ecological catastrophe. The 15-item scale was measured on a 5-point Likert Scale format that ranged from Strongly Disagree (1) to Strongly Agree (5).

Due to the nature of the present study which involves outdoor activity, the NEP scale would be interpreted according to three dimensions as observed in Thapa's (2010) outdoor recreation participation study. The three dimensions were: *Ecocentric (*six items,

Table 3.6: Environmental Concern Measurement

Dimensions	Code	Items
Ecocentric	ENC1	We are approaching the limit of the number of people the earth can support
	ENC3	When humans interfere with nature it often produces disastrous consequences
	ENC5	Humans are severely abusing the environment
	ENC11	The earth is like a spaceship with very limited room and resources
	ENC13	The balance of nature is very delicate and easily upset
	ENC15	If things continue on their present course, we will soon experience a major ecological disaster
Dualcentric	ENC2	Humans have the right to modify the natural environment to suit their needs*
	ENC7	Plants and animals have as much right as humans to exist
	ENC9	Despite our special abilities humans are still subject to the laws of nature
	ENC12	Humans are meant to rule over the rest of nature*
Techno-centrics	ENC4	Human ingenuity will ensure that we do NOT make the earth unlivable
	ENC6	The earth has plenty of natural resources if we just learn how to develop them
	ENC8	The balance of nature is strong enough to cope with the impacts of modern industrial nations
	ENC10	The so-called "ecological crisis" facing humankind has been greatly exaggerated
	ENC14	Humans will eventually learn enough about how nature works to be able to control it

Source: Dunlap *et al.* (2000); Thapa (2010). * reverse coded

Cronbach's alpha = .81) concerning attitude related to the belief that the environment is in a unstable position, and human impacts can be detrimental to survival; *Dualcentric*1(four items, Cronbach's alpha = .58) representing a symbiotic dual equality attitude between humans and the environment; *Technocentric* (five items, Cronbach's

alpha = .70) characterized by the thinking that technological innovations can solve problems, portraying a techno-fix mentality toward environmental concerns and issues. These dimensions were named based on the concept of ecocentric and technocentric dichotomy advanced by O'Riordan (1981). This concept has been employed and expanded by other researchers in the environmental literature (Kaiser & Gutscher, 2003; Kuhn & Jackson, 1989; Thapa, 1999; Thapa, 2000; Thapa, 2001). However, two of the 15 items were reverse coded to maintain the consistent directionality of the items.

Subjective norms (SN)

Subjective norm refers to beliefs about what others (family members, friends, neighbours, or social groups) will think about the related behaviour (Ajzen & Fishbein, 1980). Subjective norms were measured with four items, which required the respondents to indicate the extent that certain individual (i.e. diving buddies/partners, dive masters / instructors, other diving friends and family members) influence their behaving responsibly towards the marine life/environment while diving. Response options were ranged from 1 (not at all) to 5 (to a great extent).

Table 3.7: Subjective Norms Measurement

Code	Items
To what extent do the <u>following people expect you</u> to behave responsibly towards the marine life/environment while diving…?	
SN1	diving buddies/partners
SN2	dive masters/instructors
SN3	other diving friends
SN4	family members

Sources: Oom Do Valle *et al.* (2005)

3.2.1b Dependent Variables

Divers' underwater behaviour (UWB)

Underwater behaviour is referred to as specific responsible behaviour exhibited by divers towards both own safety / health and the protection of marine environment, while diving underwater. Divers' underwater responsible behaviour was measured with 14

Table 3.8: Underwater Responsible Behaviour Measurement

Code	Items
To your awareness, either intentionally or unintentionally, how often do you experience the following situation?	
NC1	stand or rest on coral
NC2	feed marine life underwater
NC3	hold onto coral
NC4	touch coral
NC5	collect marine life/artifacts for personal purpose
NC6	hunt marine life for fun
NC7	chase or try to ride on marine life'
SK1	maintain a safe distance from the reef
SK2	keep neutrally buoyant at all times
SK3	stay off the bottom
SD1	streamline all equipment underwater
SD2	practice good finning technique
SD3	inspect regulator reading from time to time
SD4	check underwater position/orientation regularly
SD5	bring safety sausage/signaling device
SD6	make safety stop before surfacing at the end of dive
SD7	monitor diving depth
SD8	wander away from your buddy
SD9	surface away from the group and the surface marker
SD10	ignore dive plan and dive freely

Sources: Thapa *et al.* (2006); Todd (2000); Department of Marine Park Malaysia (2009)

items. Originally, 20 marine based environmental behaviour items were adapted from the literature (Thapa *et al.*, 2006; Todd, 2000), from the environmental codes of conduct published by conservation organizations (Coral Reef Alliance and The International Ecotourism Society), from coral etiquette by Department of Marine Park, Malaysia (Department of Marine Park, 2009), together with some self-developed items. The nine self-developed items were: 'maintain a safe distance from the reef', 'inspect regulator reading from time to time', 'wander away from your buddy', 'check underwater position/orientation regularly', 'surface away from the group and the surface marker', 'ignore dive plan and dive freely', 'bring safety sausage/signaling device', 'make safety stop before surfacing at the end of dive', and 'monitor diving depth'. However, six items were discarded after the pilot study.

3.2.1c Mediating Variables

Diving attitude (DAT)

In the present study, diving attitude represents an individual's favorable or unfavorable feelings with regard to particular aspects of the diving environment. The specific attitude towards diving is represented based on the three components attitudinal model (McGuire, 1992), which consists of knowledge of specific-issues (cognitive component), awareness of behaviour consequences (belief/affective component), and personal commitment to issue resolution (conative component). The items were self-developed with reference to related literature and general practices in diving activity. A total of 15 items were generated. The cognitive component consists of 8 items concerning knowledge about diving and knowledge on regulation. The conative component consists of 3 items, regarding questions related to commitment to marine conservation.

Table 3.9: Knowledge of Specific Issue Measurement

Code	Items
	Indicate the extent of your understanding about the following issues …
DP1	pre-dive planning procedures
DP2	diving skills necessary for various types of dive
DP3	underwater safety practices
DP4	usage and handling of underwater diving equipments
REG1	prohibited activities in local Marine Parks Areas
REG2	marine conservation programs and activities
REG3	penalties for violating local marine parks regulations
REG4	the boundary for Malaysia Marine Parks

Sources: Interviews; expert opinions; Department of Marine Parks, Malaysia (2009).

Table 3.10: Commitment Measurement

Code	Items
	Indicate the extent of your involvement in diving activity
COM1	Donate money to marine/coral conservation program
COM2	Keep track with current marine conservation issues
COM3	Commit time to involve in marine conservation activities

Sources: Interviews; expert opinions

Table 3.11: Awareness of Behaviour Consequences Measurement

Code	Items
	Indicate how strongly you agree or disagree to the following statements
AC1	Feeding fish harms the ecosystem
AC2	Good control of fins and accessories avoid accidental contact with the reef
AC3	Sediments stir up by divers may kill the coral
AC4	Collecting shells (dead or alive) harms the coral ecosystem

Sources: Interviews; expert opinions; Coral Reef Alliance (2009)

The third part represents the belief/affective component with 4 items, including statement related to awareness of behaviour consequences. For the first two parts, the scale was measured on a 5-point Likert scale format that ranged from 1 (not at all) to 5 (to a great extent). However, the third part on awareness of behavioural consequences was measured on a 5-point Likert scale format that ranged from 1 (strongly disagree) to 5 (strongly agree).

Personal norms (PN)

Personal norms refer to an individual's conviction or belief that acting in a certain way is right or wrong (Schwartz, 1973). Three items were used in measuring personal norms. Two items measured personal obligation and one item represented the feeling of guilt.

Table 3.12: Personal Norms Measurement

Code	Items
	How strongly do you agree or disagree to the following statements?
PN1	I feel a strong personal obligation to conserve marine environment
PN2	I would feel guilty if I did not behave responsibly towards the marine life/environment in my dive
PN3	I am willing to spend time to participate in marine conservation activities on a regular basis

Source: Oom Do Valle *et al.* (2005)

The personal obligation items were: 'I feel a strong personal obligation to conserve marine environment', 'I am willing to spend time participating in marine conservation activities on a regular basis' and 'I would feel guilty if I did not behave responsibly towards the marine life/environment in my dive'. These items were adapted from Oom Do Valle *et al.* (2005) and were measured using a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree).

3.3 Content Validity

The instrument for the present research was developed based on an extensive review of literature from pro-environmental behaviour, recreation and diving tourism studies. In addition, five diving experts were interviewed and their opinions were consulted, especially on diving attitude and divers' underwater behaviour. These experts were dive masters and instructors whose diving experience ranged from 10 to 20 years. The contents of the interview include: development of Malaysia diving industry, conditions and environments of dive sites, behaviours and attitude of divers towards diving and environment (both on land and underwater), impacts of divers to the marine environment, diving procedures, diving techniques and problems encounter with divers.

In the process of items generation, several recommendations forwarded by Devillis (2003) have been taken into consideration. These recommendations include: a) readability level of each item; b) avoid vague pronoun references; c) avoiding exceptionally lengthy items; d) positive and negatively worded items; and e) double-barrelled items. A total of 92 items were generated in the first stage of the questionnaire development.

Though some of the items developed in this survey research were modifications of established measurement from previous studies, a few of the construct measurements are exploratory in nature. Therefore, it is necessary to ascertain the face or content validity of these measurements so as to verify its appropriateness to be used for SCUBA divers. Face or content validity is defined as 'assessment of the degree of correspondence between the items selected to constitute a summation scale and its conceptual definitions' (Hair, *et al.*, 1998, p. 88). It emphasizes the extent to which the indicators measure the different aspects of the concepts.

To establish validity, five university academicians, in the field of sports management and marketing, with diving experience were consulted to evaluate the instrument. As noted by Czaja and Blair (1996), expert panels are normally used prior to conducting a field pretest. Expert panels have been identified as one of the most consistent methods of identifying many problems and different problems in the process of questionnaire development. Besides, there is an added advantage of being relatively inexpensive. In the process, each panel members was asked to fill out the questionnaire and comment on the questionnaire. The assessment included aspects such as comprehensive coverage of the content, whether the items were well constructed and understandable, whether format of the instrument was conducive to obtaining data and lead to valid interpretations. Panel members were also asked to suggest any content areas that have been absent or that are unclear. The feedback from the panel of experts was employed to add items, reword items and delete items on the scale. Suggestions and comments by the panel members were later thoroughly discussed with the supervisor of this study and changes were made according to the purpose of the study. Thus, the original questionnaire was revised before a field study was conducted in the process of instrument development.

3.3.1 Pretesting

Field testing or pretesting generally means administering a questionnaire to respondents selected from the target population using the procedures that are planned for the main study (Czaja, 1998). To further establish its validity, the developed questionnaire was pretested using a sample of ten student divers to detect any issues that needed to be corrected before the pilot study. It is common and considered generally appropriate to use students in this context (Malhotra, 1981). The sample was university student divers

who have under gone a SCUBA diving course in the previous semester, which comprises of seven males and three females. Students participating in the pretest were asked to complete the questionnaire and provide feedback concerning the questionnaire. At the end of the session, respondent debriefing session was conducted by the researcher to identify comprehension and information retrieval problems and to assess close-ended response choices. The group discussion focuses on aspects such as identifying words or phrases that are ambiguous or difficult to understand, understanding of certain concepts, or any uncertainty of how to answer questions. The average time for respondents to complete the questionnaire was also calculated and the average time was about 12 minutes.

From the feedback, minor changes were made to few items in order to provide clarity to the respondents. In the 'personality' section, additional words were added, such as 'vivid/strong', 'feel blue (down)', 'chores (routine tasks)'. As a result of the pretest procedures, the questionnaire was finalized to be used for the pilot study. The following section explains in detail the procedure and the result of the pilot study.

3.4 Pilot Study

The pilot study is an important part in the instrument development process. It serves as a trial run and preliminary investigation of the instrument to see if it is in further need of revision. Among the objectives of pilot study are, (1) to determine whether the subjects understand the contents of the instrument, (2) to determine the reliability and the validity of the instrument (3) to obtain a set of data for trying out the proposed data treatment techniques, and (4) to familiarize the researcher with the instrument administration procedures (Baumgartner & Hensley, 2006).

A pilot test was conducted to test the internal consistency of the questionnaire items. It was conducted in Klang Valley (i.e. Damansara, Subang Jaya, Ampang, Kepong, Petaling Jaya, and Seri Kembangan) and Pulau Langkawi, Kedah. These areas were chosen because of easy accessibility to divers where many dive shops or dive operators were found. The first draft of the survey instrument was distributed to 120 divers, through contacts with dive operators and dive shops in the two areas. Self-administered and snowballing techniques were used in the distribution of questionnaires. Due to incomplete/spoiled questionnaires, data collected from one hundred divers were utilized in the process of testing the validity and reliability of the measurement instrument.

A reliability analysis was carried out to validate and operationalize the seven related variables which include experience, personality, environmental concern, personal norms, subjective norms, diving attitude and divers' underwater responsible behaviour. According to Nunnally (1978), Cronbach's alpha is a superior estimate of internal consistency of measures. A value that ranges from .5 to .6 is considered sufficient in early stages of research. Another measure to establish reliability was by examining the item-to-total correlations of each measurement scale. Item-to-total correlations provide information on the degree of correlations among indicators of the same scale (Lu *et al.*, 2007). Item with a value that is less than .25 is considered very weak, and plays very little role in conceptualizing the given factor (Nunnally, 1978). For the purpose of the present study, items with item-to-total correlation of .30 would be discarded.

The results of the reliability and item-to-total correlation analysis for the five constructs: experience, personality, environmental concern, personal norms and subjective norms, in the pilot study are presented in Table 3.13. After conducting pilot study, two items from the experience level construct were discarded due to low item-to-total correlation value, i.e. 'How long have you been involved in SCUBA diving activity?'(EXP4=.20)

and ‘On average, how often do you dive in a year?’ (EXP5=.19). Thus, only three items were used to represent experience level in the final analysis.

As shown in the Table 3.13, the lowest value of Cronbach’s alpha (α) was .614 (TEC) whereas, the highest was .892 (EXP). None of the instrument subscales indicates any

Table 3.13: Item-to-Total Correlation of Each Construct (n=100)

Experience Level (EXP) (α = .892)	Subjective Norms (SN) (α = .846)	Personal Norms (PN) (α = .700)
EXP1 .780	SN1 .795	PN1 .585
EXP2 .793	SN2 .619	PN2 .498
EXP3 .786	SN3 .750	PN3 .467

Personality (PSN) (α = .792)				
Agreeableness (AG) (α = .769)	Extraversion (EX) (α = .802)	Conscientiousness (CN) (α = .870)	Neuroticism (NU) (α = .805)	Openness (OP) (α = .683)
AG1 .585	EX1 .591	CN1 .648	NU1 .514	OP1 .555
AG2 .530	EX2 .482	CN2 .574	NU2 .542	OP2 .475
AG3 .597	EX3 .528	CN3 .724	NU3 .616	OP3 .488
AG4 .474	EX4 .728	CN4 .767	NU4 .690	OP4 .398
AG5 .518	EX5 .600	CN5 .756	NU5 .586	OP5 .240

Environmental concern (ENC) (α = .678)		
Ecocentric (ECO) (α = .772)	Dualcentric(DUA) (α = .680)	Technocentric(TEC) (α = .614)
ENC1 .451	ENC2 .560	ENC4 .406
ENC3 .560	ENC7 .434	ENC6 .243
ENC5 .548	ENC9 .422	ENC8 .435
ENC11 .389	ENC12 .405	ENC10 .415
ENC13 .544		ENC14 .355
ENC15 .600		

value that was below the threshold level (α=.60). On the whole, the pilot test confirmed that the measurement used for this study has achieved an adequate level of reliability.

Regarding item-to-total correlation, there were two items exhibiting slightly low correlation with the respective factors (i.e. OP5=.24; ENC6=.243). However, the two items were retained for the final study due to the following reasons. First, the limited sample size might have caused the values to be low. Secondly, the items were from the established scale in previous studies which have demonstrated high reliability. Thirdly, the respective scales still show acceptable reliability (α ≥.60) even with presence of these items.

Due to the exploratory nature of the two constructs in this study, exploratory factor analysis (EFA) was performed to determine the underlying dimensionality of diving attitude (DAT) and divers' underwater behaviour (UWB). The goal of EFA was to identify a smaller set of latent variables that best explain or give rise to the correlations between observed variables. Factor analysis involved two types of rotation procedures. Orthogonal rotations (e.g., varimax) require factors to be independent, whereas oblique rotations (e.g., promax) allow factors to be correlated. In the present study, principle axis factoring extraction method with promax rotation was adopted because (1) oblique rotation is best when the goal of the factor analysis is to obtain several theoretically meaningful factors; (2) oblique rotation assumes that factors are correlated to each other, which is more justifiable and more realistic in social sciences (Hair *et al.*, 1998). Kashy *et al.* (2009) also recommended researchers to use oblique rotations because this method will uncover independent factors if they exist. That is, if factors are truly uncorrelated, then this will be apparent in the matrix that displays the correlations between latent variables. A range of cut-off criteria were used to determine the number

of factors derived, such as eigen values, percentage of variance, and factor loadings (Hair *et al.*, 1998). Items with loadings lower than 0.4 or with common loadings higher than 0.4 on more than one factor were eliminated.

In the case of Diving Attitude (DAT), an initial reliability analysis on the fifteen (15) items presented satisfactory item-total correlation (>.30) on all the items in the construct (Table 3.14).

Table 3.14: Item-to-Total Correlation for Diving Attitude (DAT)

Dive Practices (DP) (α = .803)	Commitment (COM) (α = .857)	Regulation (REG) (α = .845)	Aw of Consq (AC) (α = .668)
DP1 .660	COM1 .667	REG1 .484	AC1 .514
DP2 .671	COM2 .780	REG2 .802	AC2 .542
DP3 .516	COM3 .732	REG3 .777	AC3 .616
DP4 .630		REG4 .667	AC4 .690

Following factor analysis on the fifteen (15) items formulated, four factors with Eigen values greater than 1.0, explaining 67.39% of the variance were observed. All items achieved factor loading > .40. Reliability analysis showed that α = .873. The 4 factor identified were named 'knowledge on diving practice' (4 items), 'commitment' (3 items), 'knowledge on regulations' (4 items) and 'aware of consequences' (4 items). The item-to-total correlations for DAT are presented in Table 3.15. All the fifteen items were used for further analysis.

Table 3.15: Factor Loadings for Respondents' Diving Attitude

Diving Attitude (DAT)	Factor 1	Factor 2	Factor 3	Factor 4
Knowledge on diving practice (DP)				
(DP1) pre-dive planning procedures	.874			
(DP2) diving skills necessary for various types of dive	.704			
(DP3) underwater safety practices	.634			
(DP4) usage of underwater diving equipments	.652			
Commitment (COM)				
(COM1) contributed money to conservation program		.683		
(COM2) keep track with current issues		.734		
(COM3) commit time to marine conservation		.878		
Knowledge on regulation (REG)				
(REG1) prohibited activities in MPA			.417	
(REG2) marine conservation programs			.584	
(REG3) penalties for violating regulations			.962	
(REG4) the boundary of MPA			.786	
Awareness of consequences (AC)				
(AC1) feeding fish harms the ecosystem				.520
(AC2) good control of fins and accessories				.555
(AC3) sediments stir up by divers may kill the coral				.521
(AC4) collecting shells (dead or alive) harms the coral ecosystem				.766
Number of items	4	3	4	4
% of variance explained	38.64	14.45	7.48	6.81
Cronbach's Alpha (α) (α = 0.873)	0.803	0.857	0.845	0.668

For the construct of divers' Underwater Responsible Behaviour (UWB), a preliminary reliability analysis was conducted on twenty (20) items generated earlier. Six items were below the suggested threshold value of 0.30 and thus was discarded from further analysis. These items were: NC5 - 'collect marine life/artifacts for personal purpose'(.26), NC6 - 'hunt marine life for fun'(.22), NC7 - 'chase or try to ride on marine life'(-.04), SD8 - 'wander away from your buddy'(.19), SD9 - 'surface away from the group and the surface marker' (.21), and SD10 - 'ignore dive plan and dive freely'(.24).

Table 3.16: Item-to-Total Correlation for Underwater Responsible Behaviour (UWB)

Safety Diving (SD) (α = .84)	Non-contact (NC) (α = .77)	Buoyancy Control (BY) (α = .73)
SD1 .574	NC1 .480	SK1 .642
SD 2 .634	NC2 .446	SK2 .526
SD3 .597	NC3 .701	SK3 .503
SD4 .600	NC4 .614	
SD5 .591		
SD6 .517		
SD7 .610		

Factor analysis on the remaining 14 items revealed three factors with Eigen values greater than 1.0, explaining 58.8% of the variance. All items achieved factor loading > .40. Reliability analysis showed that α = .81. The 3 factors identified were named 'safety diving behaviour' (7 items), 'non-contact diving behaviour' (4 items), and 'buoyancy control behaviour' (3 items). The item-to-total correlation for UWB is presented in Table 3.17.

Table 3.17: Factor Loadings for Underwater Responsible Behaviour

Underwater Responsible Behaviour	Factor 1	Factor 2	Factor 3
Safety Diving (SD)			
(SD1) streamline all equipment	.780		
(SD2) practice good finning technique	.796		
(SD3) inspect regulator reading from time to time	.412		
(SD4) check underwater position regularly	.552		
(SD5) bring safety sausage/signalling device	.472		
(SD6) make safety stop before the end of dive	.672		
(SD7) monitor diving depth	.648		
Non-contact diving (NC)			
(NC1) stand or rest on coral *		.575	
(NC2) feed marine life *		.557	
(NC3) hold onto coral*		.866	
(NC4) touch coral*		.730	
Buoyancy control diving (BY)			
(SK1) maintain a safe distance from the reef			.897
(SK2) keep neutrally buoyant at all times			.640
(SK3) stay off the bottom			.471
Number of items	7	4	3
% of variance explained	32.38	18.10	8.40
Cronbach's Alpha (α) (α = 0.81)	0.84	0.77	0.73

*reverse coded

As a summary, the Cronbach's alpha (reliability analysis) values for the seven constructs were: experience level (α= .89), personality (α= .79), environmental concern (α= .76), subjective norms (α= .85), personal norms (α= .70), diving attitude (α= .87), and underwater responsible behaviour (α= .81). An alpha of 0.7 or above is considered acceptable as a good indication of reliability (Nunnally & Bernstein, 1994). Therefore, the pilot test confirmed that the measurement used for this study has achieved an

adequate level of reliability. Based on the results of the pilot test, the final version of the survey instrument was developed.

3.5 Data Analysis Procedure

As mentioned earlier, the main purpose of the present study was to investigate the relationship among personal factors, diving attitude, subjective norms, personal norms and divers' underwater behaviour. Therefore, a model, based on the above constructs, was developed and proposed. Following this, the findings of the investigation were computed by the use of several statistical techniques involving Statistical Package for Social Sciences 16 (SPSS 16) and Amos 7 software program.

3.5.1 Scale Purification

To achieve the aim of the study, ten hypotheses were established. Before proceeding to the hypotheses testing, a scale purification process which involved the assessment of Cronbach's alpha and item-to-total correlations was conducted. This process of scale purification is widely accepted as a common practise in many empirical studies (Carter, 1990; Lu *et al.*, 2007); (Chang & Chelladurai, 2003). The scale purification process was also employed to the results of certain constructs that have undergone Exploratory Factor Analysis (EFA) in the pilot study.

3.5.2 Multivariate Assumptions

To ensure that the the data of the present study meets the multivariate assumptions, the existence of linearity, normality, homoscedasticity, outliers and multicollinearity were examined.

3.5.2a Normality, Outliers, Linearity and Homoscedasticity

Normality is generally described by a curve that is symmetrical and bell-shaped. Normality can be determined by assessing the variable's level of skewness and kurtosis. Several statisticians have suggested that a threshold value between + 1.00 for both skewness and kurtosis as indicative departures from normality (MacCallum & Austin, 2000; Morgan *et al.*, 2001).

Outliers are cases or observations in a data set which are out-of-range in values, compared to the majority of the other cases in the data set. They are unusually large or unusually small values compared to the others. An outlier might be the result of an error in measurement, which may distort statistical test results and affect the interpretation of the data. Outliers can be detected using the residual scatterplot. Cases that have a standardized residual value of more than 3.3 or less than -3.3 in the scatterplot are considered outliers (Tabachnick & Fidell, 2007).

Another important assumption which needs attention is the linear relationship between independent and dependent variables and the variables should exhibit homoscedasticity. The violation of these assumptions will underestimate the degree of the correlation between the related variables, thus resulting in a degradation of analysis (de Vaus, 2002). Homoscedasticity is commonly recognized as homogeneity or uniformity of variance. Homoscedasticity refers to the assumption that the dependent variable exhibits similar amounts of variance across the range of values for an independent variable. It is evaluated for pairs of variables. There are two approaches for evaluating homoscedasticity, that is, the graphical and statistical methods. The graphical method utilizes the boxplot technique, whereas the statistical method employs the Levene statistic which SPSS computes for the test of homogeneity of variances.

3.5.2b Multicollinearity

Multicollinearity occurs when two or more independent variables are highly correlated. When two variables are highly correlated, they are fundamentally measuring the same phenomenon or construct, which means that they provide redundant information about the response. The presence of multicollinearity could cause numerous problems leading to confusing or misleading results of regression coefficient estimates (Tabachnick & Fidell, 2007). By assessing the Tolerance and Variance Inflation Factors (VIF), it is possible to examine the existence of multicollinearity in the data set (Hair *et al.*, 2006). Tolerance is a measure of collinearity, which represents the degree of the independent variable's variability that is not explained by the other independent variable in the model. It is reported by most statistical programs such as SPSS, which is computed using the formula $1-R^2$ for each variable. On the other hand, Variance Inflation Factors (VIF) is the reciprocal of Tolerance, and is calculated by 1 divided by Tolerance. A tolerance value less than 0.1 and VIF value of more than 10 would indicate the possibility of multicollinearity and need further attention.

3.5.3 Confirmatory Factor Analysis (CFA)

In the present study, a confirmatory factor analysis (CFA) was used to validate the measurement model of the constructs and the proposed research model. CFA is a technique which analyses the extent to which the specification of the assigned factors matches the data collected in the study. The main purpose of CFA is to test whether theoretically predicted latent factors underlie a set of variable scores as hypothesized. CFA plays a critical role in measurement model validation in path or structural analyses (MacCallum & Austin, 2000). When performing SEM, it is common for researchers to evaluate the measurement model (whether the measured variables accurately reflect the desired constructs or factors) before assessing the structural model. Thompson (2004)

has noted that, "It makes little sense to relate constructs within an SEM model if the factors specified as part of the model are not worthy of further attention" (p. 110). In many cases, problems with SEM models are due to measurement model issues that can be identified with CFA (Brown, 2006). Generally, a few assumptions are to be considered in carrying out CFA. These include: (a) the specified model is theory grounded, (b) data with a large sample size (200 persons are typically suggested) and (c) the variables are continuously distributed (at least interval level).

Confirmatory factor analysis can be used to assess the measurement model by examining the constructs' unidimensionality, reliability and validity. The unidimensionality of the constructs was examined by evaluating the goodness-of-fit (GOF) of the proposed model (Bagozzi & Baumgartner, 1994), the direction of paths and the respective significance level of each variable (Garver & Mentzer, 1999). The goodness-of-fit is a measure that reflects how well a specified model 'represents' the collected data. The proposed model in the current study is examined utilizing several fit indices namely the chi-square statistics (χ^2), degree of freedom (df), p-value of the chi-square statistic (Bollen, 1989), relative chi-square (χ^2/df) (Joreskog, 1993), the root mean square of error estimation (RMSEA) (Browne & Cudeck, 1993), comparative fit indices (CFI) (Hu & Bentler, 1999), and the standardized root mean square residual (SRMR) (Hair *et al.*, 2006).

According to Hair *et al.* (2006), construct reliability is a measure of reliability and internal consistency of the measured variables representing a latent construct. The construct must be established before its construct validity can be assessed. This value can be computed by assessing the item reliability (squared multiple correlation), composite reliability and average variance extracted. Construct validity concerns the

extent to which a set of measured variables actually represents the theoretical latent construct those variables are designed to measure. In regards to face and content validity, the survey instruments in the present study are considered established as they have been aptly developed through a thorough review of related literature and were later refined with reference to relevant experts' opinion. The CFA procedure will further determine the convergent validity and discriminant validity of the constructs in the study. Convergent validity represents the extent to which items of the same latent variable are measuring the same construct. On the other hand, discriminant validity indicates the extent to which a construct is truly distinct from other constructs.

3.5.4 Structural Equation Modeling (SEM)

The current study utilised a structural equation modelling (SEM) as the statistical technique to analyse the hypothesized relationships. SEM involves the simultaneous application of factor analysis whereby the latent factors load on the observed variables (measurement model), and multiple regression analysis of the latent factors on each other (structural model) -- (Anderson & Gerbing, 1988; Byrne, 1988; Cuttance & Ecob, 1987; Martin, 1987). SEM combines the factor (measurement) and path (structural) models into a single model, whereby each latent factor is regressed onto the others. Kaplan (2000) has highlighted that SEM has the advantage of being able to estimate the magnitude of error terms, unlike the approach of path analysis, that relied solely on multiple regression procedures, and which assumed that error terms are zero. According to Garson (2005), SEM is considered a more powerful and popular multivariate technique than others, because it can examine a chain of dependence relationship at the same time. This was supported by Hair *et al.* (2006), stating that SEM empirically examine a theoretical model by involving both the measurement model and structural

model in one analysis. Thus, it considers information about measurement and utilizes them for testing the structural model.

Generally, the SEM procedure comprises of two aspects. As described by Bryne (2001), the first aspect relates to the series of structural equations that correspond to the causal processes observed in the study. The second part involves the illustration of the structural links in a pictorial model. With that, the hypothesized relationships in the proposed model will then be statistically analysed. The extent to which the model 'fits' the data can be verified from the analyzed results. However, hypothesis testing can be carried out only when the model achieves the acceptable level of goodness of fit.

3.6 Summary

The current chapter explained the research design involved in conducting this study and the methodological procedures that were used to test the overall proposed model. In relation to the purpose of the study, a cross-sectional research design was employed and data were collected through the use of survey in the form of self-administered questionnaire. Part of the instrument was adopted and part of it was self-developed based on previous literature.

A total of 413 responses were used for data analysis. The reliability of the instruments was examined through the item-to-total correlation and Cronbach alphas during scale purification process. EFA was involved in the data reduction process. Following this, the data were examined to see whether multivariate assumptions were fulfilled. The measurement model of the constructs and the overall model were later validated by CFA procedures, in which SEM was performed. Finally, hypotheses testing were executed based on the SEM results.

CHAPTER 4: RESULTS AND DATA ANALYSIS

4.1 Introduction

The present study utilized SEM technique to investigate the causal relationship among personal factors (i.e. experience, personality, environmental concern), subjective norms, personal norms on underwater behaviour as well as examining specific attitude (diving attitude) as the variable mediating the model. Several procedures which include, analysis of item-to-total correlation, Cronbach's Alpha, and factor loadings were employed to purify the data. As a prerequisite, exploratory factor analysis was performed. The measurement model was validated using confirmatory factor analysis (CFA). The results of the analyses are reported in this chapter.

4.2 Profile of Respondents

The demographic profile of the respondents was presented in Table 4.1. In terms of gender, the result indicated that there were slightly more male respondents (57.6%) than female respondents (42.4%). This representation is consistent with many other SCUBA diving studies, whereby more males are found to involve in SCUBA diving activities than females (Mundet & Ribera, 2001); (Dearden *et al.*, 2006); Musa, 2002; Musa *et al.,* 2011). Early studies reported that SCUBA diving is very much a male–dominated sport, with up to 80% of divers being men (Tabata, 1992; Davis *et al*., 1996; Mundet & Ribera, 2001; (Hampton & Haddock-Fraser, 2010) However, the gap seems to be gradually narrowing between gender, with female divers constitute 34.3% in diving study by O'Neill *et al.* (2000), 36% among Phuket divers (Bennett, 2002), 35.2% among Sipadan divers (Musa, 2002), and 39.1% among Malaysian divers (Musa *et al*, 2011). The result

of the present study, with 42.4% female divers, indicated the changing trend of gender distribution among divers in recent years.

From the data collected, it was observed that there was a higher percentage (62.0%) of foreign respondents compared to domestic respondents (38.0%). This reflected that there are more foreign divers involved in SCUBA diving activities in the country, compared to domestic divers. Cater (2008) noted that many active divers live in regions with temperate climate, and prefer to engage in the sport, sometimes exclusively, when visiting tropical regions on holiday. There were evidences that the Malaysian dive sites are commonly frequent by foreign tourists (Hampton & Haddock-Fraser, 2010; O'Neill *et al.*, 2000; Musa *et al.*, 2006). As noted by Hampton and Haddock-Fraser (2010), dive tourists in Malaysia consist of a significant proportion of international arrivals. There are many reasons that foreign divers are attracted to dive in Malaysia. One of the main reasons would be the diving conditions, the richness of coral species (about 350 species) with diversity of flora and fauna found in the Malaysian aquatic environment. Malaysia waters have been considered to be a globally important area of coral biodiversity (Harborne *et al.*, 2000). The effort in promotion and marketing of Malaysia as a dive tourism destination by tourism agencies would be another contributing factor, too. In addition, the cheaper cost of diving, accommodation, transportation and convenience of accessibility to dive sites, also play important roles in attracting foreign divers. Consequently, this contributed to the majority of foreign divers among the respondents.

In relation to marital status, about two-thirds (64.6%) of the respondents were still single. Ninety three (22.6%) respondents were married, followed by 12.8% of the sample belong to 'others' (i.e. divorced, widowed) marital status.

Table 4.1: Profile of Respondents

Demographic characteristics	Frequency (N= 413)	Percentage (%)
Gender		
Male	238	57.6
Female	175	42.4
Country		
Domestic	157	38.0
Foreign	256	62.0
Marital status		
Single	267	64.6
Married	93	22.6
Others	53	12.8
Age (years)		
18- 30	244	59.0
31- 40	123	29.8
41-50	35	8.5
>50	11	2.7
Education level		
Secondary and below	51	12.3
Diploma	104	25.2
Graduate	178	43.1
Post graduate	80	19.4

In regards to age, the largest age group category was 18 to 30 years, which constituted 59.0% of the total respondents. The second largest age group was 31 to 40 years , which comprises 29.8% of the total respondents, followed by 8.5% of the age group of 41 to 50 years, and 2.7% of the total sample were aged more than 50 years old. It can be summarized that the majority of the respondents (88.8%) were young divers between the age of 18 to 40 years old. The mean age for the respondents in the present study was found to be 30.5 $\pm$ 7.75 years old, which was younger compared to (Musa, 2002) study on Sipadan Island (mean=34.9 years) and Layang-Layang Island (Musa *et al.*, 2006)

with mean age of 38.5 years old. This result could be more representative of the divers in Malaysia as the data was collected from five most popular dive islands, compared to Musa's studies which were from individual islands only. The finding indicated that diving is a recreational activity that appeals to young, active individuals. The recreational activity has become more affordable and popular for the younger divers.

Regarding the respondents educational level, 43.1% of the total respondents were graduates, who formed the largest group. This was followed by 25.2% of the total respondents with diploma qualification, 19.4% with post graduate degrees, and 12.3% have secondary level education or below. The demography of educational background revealed that majority of the respondents (87.7%) have achieved tertiary academic qualification of diploma or higher. This finding is consistent with a number of other studies of SCUBA diver (Davis & Tisdell, 1995; Ditton *et al.,* 2002; Musa, 2002; Musa *et al.,* 2011; Thapa *et al.,* 2005) in Malaysia and some other parts of the world.

4.3 Scale Purification

In the scale purification process, the scale of the three uni-dimensional constructs, that is experience level, personal norms and subjective norms were assessed through item-to-total correlations and Cronbach's alpha value. The results were illustrated in Table 4.2. All the items in the respective constructs indicated good item-to-total correlations scores which range from .518 (SN2) to .862 (EXP1), which are above the cut-off point of .5 (Lu *et al.*, 2007). The Cronbach's alpha values for the items in the respective constructs were well above the satisfactory standard ($\geq$ .70). The results ranged from .758 (subjective norms) to .922 (experience).

Table 4.2: Mean, Standard Deviation, Item-to-Total Correlations and Cronbach's Alpha

Items	Mean	SD	Item-to-total correlations	Cronbach's alpha
Experience (EXP)				.922
EXP1	2.40	1.719	.862	
EXP2	2.46	1.506	.852	
EXP3	2.68	1.533	.811	
Personal norms (PN)				.795
PN1	4.327	.768	.677	
PN2	4.591	.646	.637	
PN3	4.063	.786	.600	
Subjective norms (SN)				.758
SN1	4.383	.699	.688	
SN2	4.663	.536	.518	
SN3	4.300	.814	.654	

4.3.1 Exploratory factor analysis

Exploratoty Factor Analysis (EFA) was performed on the four multi-dimensional constructs (i.e. personality, environmental concern, diving attitude and underwater behaviour) in the present study. A range of cut-off criteria were used to determine the number of factors derived, such as eigen values, percentage of variance, and factor loadings (Hair *et al.*, 1998). At this stage, items with loadings lower than 0.5 or with common loadings higher than 0.5 on more than one factor were eliminated. In addition, items with item-to-total correlation of less than .30 would be discarded in the present study. As suggested by Nunnally(1978), item with a correlation value that is less than .25 is considered very weak, and plays very little role in conceptualizing the given factor. The EFA results of the four constructs were presented in the following section.

Personality

For the construct of personality (PSN), factor analysis was conducted on the twenty five (25) items with the data collected from the sample (N=413). However, eight items were

eliminated either because of low factor loading (<.05) or/and below the suggested threshold item-to-total correlation value of 0.30. The eliminated items were one item in

Table 4.3: EFA for Personality

Personality (PSN)	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
Conscientiousness					
CN2- chores done right away	.749				
CN3- carry out my plans	.838				
CN4- stick to plans	.824				
Openness to experience					
OP1- vivid/strong imagination		.687			
OP2- carry the conversation to a higher level		.755			
OP3- enjoy hearing new ideas		.522			
OP4 - importance of arts		.656			
Extraversion					
EX1- make friends easily			.728		
EX3- handling social situations			.584		
EX4- comfortable around people			.609		
Neuroticism					
NU1- I rarely get irritated*				.695	
NU2- comfortable with myself				.516	
NU3- seldom feel blue				.693	
NU4- not easily bothered by things				.732	
Agreeableness					
AG2 - good word for everyone					.530
AG3 - accept people as they are					.712
AG5 - make people feel at ease					.560
Number of items	3	4	3	4	3
% of variance explained	30.49	10.04	7.81	6.58	5.19
Cronbach's Alpha (α) (α = 0.637)	0.766	0.665	0.743	-.668	.673

*reverse coded

neuroticism (NU5), two items from extraversion (EX2, EX5), one item in openness to experience (OP5), two items in agreeableness (AG1, AG4), and two items from conscientiousness (CN1, CN5). The result of the factor analysis for the remaining 17 items yield five factors with Eigen values greater than 1.0, explaining 60.11% of the variance (Table 4.3).

A reliability analysis was conducted on the 17 items and the results were presented in Table 4.4, indicating item-to-total correlation values well above the suggested threshold value of 0.30.

Table 4.4: Reliability Analysis for Personality (PSN)

Agreeableness (AG) (α = .769)	Extraversion (EX) (α = .802)	Conscientiousness (CN) (α = .870)	Neuroticism (NU) (α = .805)	Openness (OP) (α = .683)
AG2 .530	EX1 .728	CN2 .709	NU1 . 695	OP1 .687
AG3 .712	EX3 .564	CN3 .840	NU2 .446	OP2 .755
AG5 .562	EX4 .609	CN4 .824	NU3 .693	OP3 .462
			NU4 .732	OP4 .656

Environmental Concern

EFA was conducted on the 15 items representing Environmental Concern (ENC). Three factors with Eigen values greater than 1.0, which explained 54.07% of the variances, were obtained. However, five items (ENC4, ENC6, ENC7, ENC9, ENC 14,) were discarded due to low factor loading (<.50) and item-to-total correlation (< .30). Therefore 10 items were used for further analysis and the results were as follows:

Table 4.5: EFA for Environmental Concern

Environmental concern	Factor 1	Factor 2	Factor 3
Ecocentric (ECO)			
(ENC1) We are approaching the limit of the number of people the earth can support	.519		
(ENC3) When humans interfere with nature it often produces disastrous consequences	.528		
(ENC5) Humans are severely abusing the environment	.517		
(ENC11) The earth is like a spaceship with very limited room and resources	.524		
(ENC13) The balance of nature is very delicate and easily upset	.515		
(ENC15) If things continue on their present course, we will soon experience a major ecological disaster	.696		
Dualcentric (DUA)			
(ENC2) Humans have the right to modify the natural environment to suit their needs □		.761	
(ENC12) Humans are meant to rule over the rest of nature □		.554	
Technocentric (TEC)			
(ENC8) The balance of nature is strong enough to cope with the impacts of modern industrial nations			.514
(ENC10) The so-called "ecological crisis" facing humankind has been greatly exaggerated			.864
Number of items	6	2	2
% of variance explained	28.27	13.82	8.55
Cronbach's Alpha (α) (α = 0.76)	0.717	0.635	0.652

*reverse coded

The results of reliability analysis for the ten items of environmental concern were as shown in Table 4.6. Item-to-total correlation values for all the items were above the suggested threshold value of 0.30.

Table 4.6: Reliability Analysis for environmental concern

Ecocentric (ECO) (α = .717)	Dualcentric (DUA) (α = .635)	Technocentric (TEC) (α = .652)
ECO1 .483	ECO2 .474	ECO8 .484
ECO3 .414	ECO12 .475	ECO10 .484
ECO5 .416		
ECO11 .413		
ECO13 .484		
ECO15 .522		

Diving Attitude (DAT)

Following factor analysis on the original 15-item DAT construct, two items (DP3 and AC2) were discarded due to low factor loading (< .40). Four factors with Eigen values greater than 1.0, explaining 71.41% of the variance were observed. Reliability analysis showed that α = .854. The 4 factors identified were named 'knowledge on diving practice' (3 items), 'commitment' (3 items), 'knowledge on regulations' (4 items) and 'aware of consequences' (3 items). The result was presented in Table 4.7.

A reliability analysis on the thirteen (13) items presented satisfactory item-to-total correlation (>.30) on all the items in the construct. The item-to-total correlations for DAT were presented in Table 4.8.

Table 4.7: EFA for Diving Attitude

Diving Attitude (DAT)	Factor 1	Factor 2	Factor 3	Factor 4
Knowledge on diving practice (DP)				
(DP1) pre-dive planning procedures	.816			
(DP2) diving skills necessary for various types of dive	.856			
(DP4) usage of underwater diving equipments	.751			
Commitment (COM)				
(COM1) contributed money to conservation program		.748		
(COM2) keep track with current issues		.765		
(COM3) commit time to marine conservation		.794		
Knowledge on regulation (REG)				
(REG1) prohibited activities in MPA			.555	
(REG2) marine conservation programs			.609	
(REG3) penalties for violating regulations			.919	
(REG4) the boundary of MPA			.891	
Awareness of consequences (AC)				
(AC1) feeding fish harms the ecosystem				.538
(AC3) sediments stir up by divers may kill the coral				.575
(AC4) collecting shells (dead or alive) harms the coral ecosystem				.817
Number of items	3	3	4	3
% of variance explained	14.54	10.12	38.45	8.30
Cronbach's Alpha (α) (α = 0.854)	0.828	0.804	0.864	0.663

Table 4.8: Reliability Analysis for Diving Attitude

Dive Practices (DP) (α = .828)	Commitment (COM) (α = .804)	Regulation (REG) (α = .864)	Awareness of consequences (AC) (α = .663)
DP1 .690	COM1 .609	REG1 .588	AC1 .432
DP2 .756	COM2 .661	REG2 .761	AC3 .466
DP4 .654.	COM3 .681	REG3 .791	AC4 .584
		REG 4 .729	

Underwater Responsible Behaviour

For the construct of divers' Underwater Responsible Behaviour (UWB), EFA was again conducted on the fourteen (14) items generated earlier. All items achieved factor loading > .50, and revealed three factors with Eigen values greater than 1.0, explaining 52.84% of the variance (Table 4.9).

Table 4.9: EFA for Underwater Responsible Behaviour

Underwater Responsible Behaviour	Factor 1	Factor 2	Factor 3
Safety Diving (SD)			
(SD1) streamline all equipment	.522		
(SD2) practice good finning technique	.584		
(SD3) inspect regulator reading from time to time	.518		
(SD4) check underwater position regularly	.564		
(SD5) bring safety sausage/signalling device	.543		
(SD6) make safety stop before the end of dive	.592		
(SD7) monitor diving depth	.704		
Non-contact diving (NC)			
(NC1) stand or rest on coral *		.512	
(NC2) feed marine life *		.517	
(NC3) hold onto coral*		.758	
(NC4) touch coral*		.703	

Buoyancy control diving (BY)			
(SK1) maintain a safe distance from the reef			.696
(SK2) keep neutrally buoyant at all times			.776
(SK3) stay off the bottom			.638
Number of items	7	4	3
% of variance explained	29.63	14.24	8.97
Cronbach's Alpha (α) (α = 0.81)	0.774	0.713	0.751

*reverse coded

Reliability analysis for UWB revealed that α = .81. All items were observed to be above the suggested threshold item-to-total correlation value of 0.30. Thus, fourteen items were retained and used for further analysis. The item-to-total correlation for UWB is presented in Table 4.10.

Table 4.10: Reliability Analysis for Underwater Responsible Behaviour

Safety Diving (SD) (α = .774)	Non-contact (NC) (α = .713)	Buoyancy Control (BY) (α = .751)
SD1 .492	NC1 .479	SK1 .556
SD 2 .581	NC2 .400	SK2 .657
SD3 .471	NC3 .571	SK3 .520
SD4 .511	NC4 .542	
SD5 .493		
SD6 .392		
SD7 .512		

The exploratory factor analysis procedures have identified respective dimensions for each on the four multi-dimensional construct. Items that did not meet to the necessary criteria were discarded from the constructs. The resulted items representing each construct were: 17 items for personality, 10 items for environmental concern, 13 items

for diving attitude, and 14 items for underwater responsible behaviour. As a summary, the Cronbach's alpha (reliability analysis) values for the four constructs were: personality (α= .64), environmental concern (α= .76), diving attitude (α= .85), and underwater responsible behaviour (α= .81). An alpha of 0.6 or above is considered acceptable indication of reliability (Nunnally & Bernstein, 1994). Therefore, the EFA test confirmed that the measurement used for this study has achieved an adequate level of reliability. Based on the results of the EFA, further confirmatory factor analysis (CFA) was conducted.

4.3.2 Confirmatory factor analysis

Confirmatory factor analysis (CFA) and SEM were used to test the conceptual model that examined the antecedents of divers' underwater behaviour. According to Anderson and Gerbing (1988), confirmatory measurement models should be evaluated and re-specified before measurement and structural equation models are examined simultaneously. Thus, before testing the overall measurement model, each construct in the model was analyzed separately. Thus, CFA was conducted with structural equation model (SEM) using AMOS 16.0 software with the 413 samples to test the underlying dimensions for four constructs namely, personality, environmental concern, diving attitude and divers' underwater behaviour.

To improve the measurement of the construct, two criteria are taken into consideration. Items that have standard residual covariance value greater than 2.58 and modification indices greater than 15.0 will be deleted for the enhancement of model fit. Each construct was evaluated using multiple fit criteria namely the chi-square statistics (χ^2), degree of freedom (df), p-value of the χ^2 statistics, relative chi-square (χ^2/df),

comparative fit index (CFI), the root mean square error of approximation (RMSEA), and the standardized root mean square residual (SRMR).

Coughlan and Mullen (2008) noted that it is not necessary to report all model fit indices in the program's output as it will burden both a reader and a reviewer. However, reporting a variety of indices is necessary as different indices reflect a different aspect of model fit(Crowley, 1997). Several researchers have recommended the use of the Chi-Square test, the RMSEA, the CFI and the SRMR as appropriate model fit indices (Hu & Bentler, 1999; Boomsma, 2000; Kline, 2005). These indices have been preferred over other indices as they have been found to be the most insensitive to sample size, model misspecification and parameter estimates (Hooper *et al.*, 2008) Based on these authors' recommendations, the Chi-Square statistic, its degrees of freedom and p value, the RMSEA, the SRMR, and the CFI was chosen to be used in the present research.

In the present study, Chi square (χ^2) test functions as a statistical method for evaluating the related models. It estimates the difference between covariances generated by the proposed model and the expected covariances based on theory (Satorra & Bentler, 1994). As explained by Kulas *et al.* (2008), a low χ^2 index shows a better match of the implied covariance matrix to the actual covariance matrix. Therefore, smaller $\chi 2$ value indicates better fitting models and an insignificant $\chi 2$ is desirable.

CFI (comparative fix index) describes the relative amount of variances and covariances in the data that are accounted for by the model under investigation (Saenz. T *et al.*, 1999, p. 203). CFI is one of the most popularly reported fit indices due to being one of the measurements which is least effected by sample size (Fan, 1999) . As suggested by most researchers (Byrne, 1998; Hu & Bentler, 1999; Tabachnick & Fidell, 2007) , CFI

close to 1 indicates a very good fit, value equal or greater than 0.9 or close to 0.95 indicates good fit.

Another measure to assess the model fit is the Root Mean Square Error of Approximation (RMSEA), which provides a measure of fit that adjusts for parsimony by assessing the discrepancy per degree of freedom in the model. In other words, RMSEA tells us how well the model, with unknown but optimally chosen parameter estimates would fit the populations' covariance matrix (Byrne, 1998). It has been recognised as one of the most informative fit indices because of its sensitivity to the number of estimated parameters in the model (Hooper, Coughlan & Mullen, 2008; Diamantopoulos & Siguaw, 2000). Hu and Bentler (1999) have suggested RMSEA $\leq$ .06 as the cutoff for a good model fit. The RMSEA value for the proposed model was .043, which means only about 4.3% of the variances and covariances were left unexplained. This indicates the model has a good fit.

SRMR (standardized RMR, root mean square residual) determines the average difference between the hypothesized and observed variances and covariances in the model, based on standardized residuals (Hair, *et al.*, 2006). The smaller the SRMR, the better the model fit. SRMR = 0 indicates perfect fit. A value less than .08 is considered good fit.

Based on the above model fit indices, the result of each construct is reported as follows.

Personality

In the analysis, seventeen items representing the five dimensions of personality produced result that marginally fit with the data. To improve model fit, item parcelling

(combining items into small groups of items within scales or subscales) was constructed for the dimension of neuroticism and openness to experience. The two dimensions were parcelled due to low coefficient alpha value and were having more items than the other dimensions. As suggested by MacCallum, Widaman, Zhang, and Hong (1999), parcelled solutions can reduce the number of parameters estimated, resulting in a reduction in sampling error and present better models of fit. To meet to the condition of uni-dimensionality, item parcels were constructed only within items of the same dimension. Thus the four items in neuroticism and openness to experience were parcelled into two items. Consequently, a 13-item model for personality construct was obtained from the CFA. The data were a good fit to the model (see Figure 4.1). The Comparative Fit Index (CFI = .968) was at or above the frequently recommended minimum level of .90. Root Mean Square of Approximation (RMSEA = .050) and Standardized Root Mean Square Residual (SRMR= .029) were better than the often-recommended level of .10 (e.g., Hu & Bentler, 1999). The results thus confirm the factor structure revealed as shown in Figure 4.1.

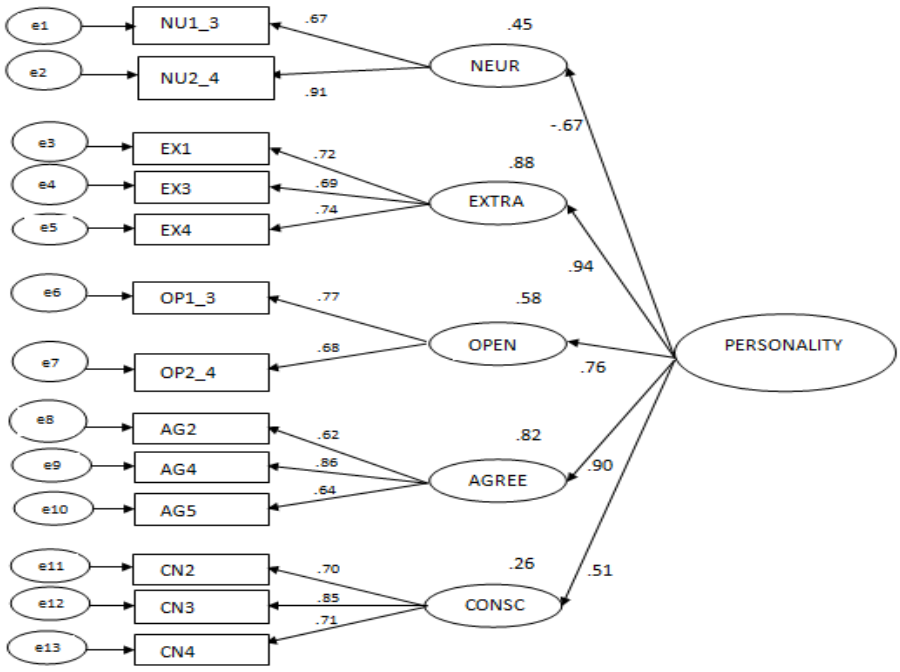

Figure 4.1: Result of Measurement Model for Personality

Environmental concern

In the case of environmental concern, all the ten items from EFA were used in the CFA. In order to improve model fit, item parcelling was also constructed for the dimension of ecocentric. The six items of ecocentric were parcelled into three items. Thus, a 7-item model for environmental concern was produced as shown in figure 4.2. The data showed a good fit to the model. The Comparative Fit Index (CFI = .955) was at or above the frequently recommended minimum level of .90. Root Mean Square of Approximation (RMSEA = .081) and Standardized Root Mean Square Residual (SRMR= .042) were better than the often-recommended level of .10 (Hu & Bentler, 1999). The results thus confirm the factor structure revealed as shown in Figure 4.2.

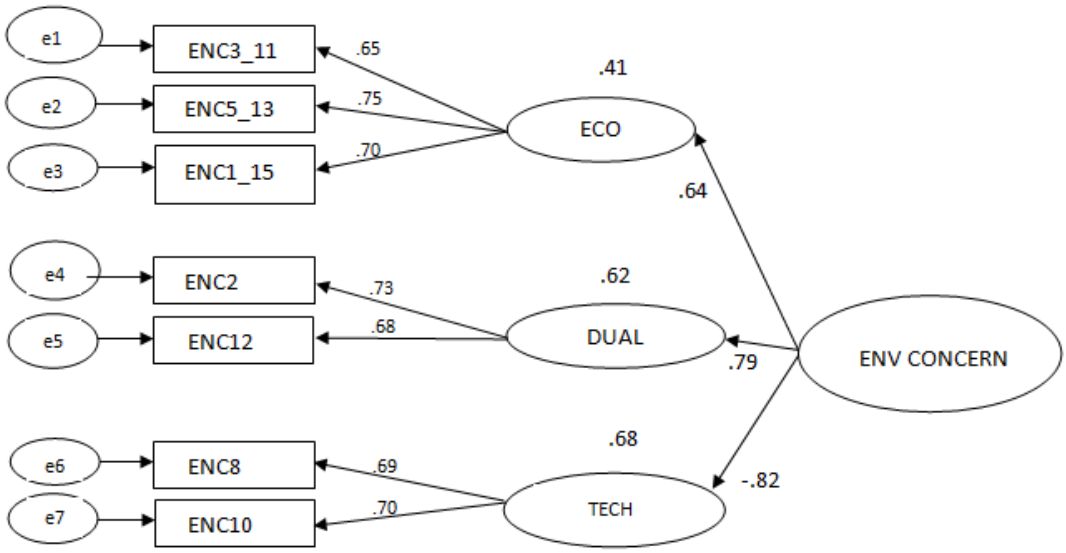

Figure 4.2: Result of Measurement Model for Environmental Concern

Diving attitude

For the diving attitude construct, the CFA confirmed the four-factor structure revealed in the EFA analysis. However, the awareness of consequences (AC) factor (3 items) was eliminated from further analysis, due to low coefficient alpha value (.16) of less than .30 (Joreskog, 1993). Another three items (REG1, REG4, DP1) were also

discarded due to high standard residual covariance value > 2.58 and modification indices > 15.0. Hence, only seven items were retained to represent the three dimensions in diving attitude. The diving attitude was represented by commitment (3 items), knowledge of dive practice (2 items), and knowledge on regulations (2 items). The Comparative Fit Index (CFI = .996) was at or above the frequently recommended minimum level of .90. Root Mean Square of Approximation (RMSEA = .035) and Standardized Root Mean Square Rresidual (SRMR= .020) were better than the often-recommended level of .10 (Hu & Bentler, 1999). The results thus confirm the factor structure revealed as shown in Figure 4.3.

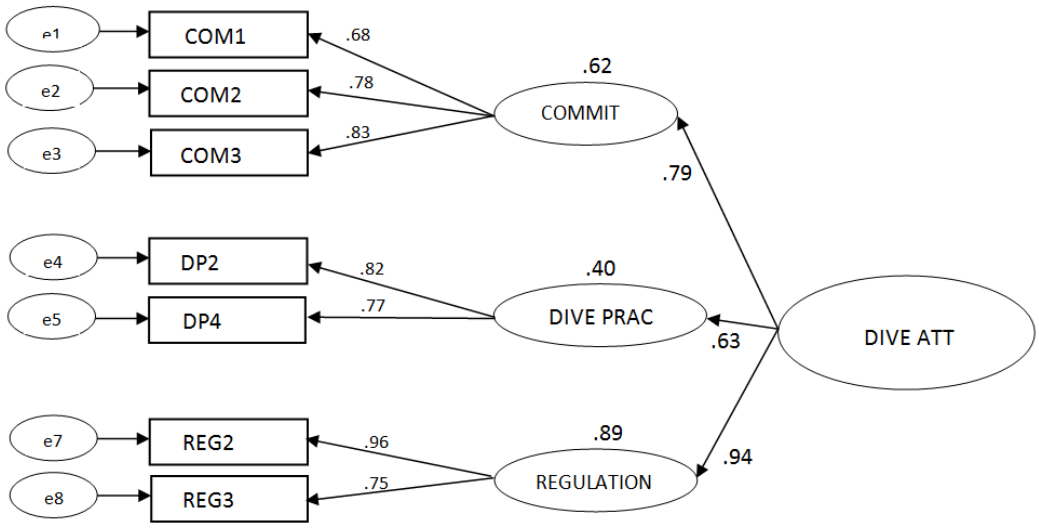

Figure 4.3: Result of Measurement Model for Diving Attitude

Divers' underwater behaviour

As for divers' underwater behaviour construct, seven items were discarded due to high standard residual covariance value > 2.58 and modification indices > 15.0. The eliminated items were: four items from 'safety diving' (SD3, SD5, SD6, SD7), two items from 'non contact diving' (NC2, NC3), and one item from 'buoyancy control diving' (SK3). Consequently, the three identified dimensions were represented by seven items. These were safety diving behaviour (3 items), non contact diving behaviour (2

items) and buoyancy control diving behaviour (2 items). The elimination of these items produced a good fit to the model. The Comparative Fit Index (CFI = .996) was at or above the frequently recommended minimum level of .90. Root Mean Square of Approximation (RMSEA = .028) and Standardized Root Mean Square Residual (SRMR= .026) were better than the recommended level of .10 (Hu & Bentler, 1999). The results thus confirm the factor structure revealed as shown in Figure 4.4.

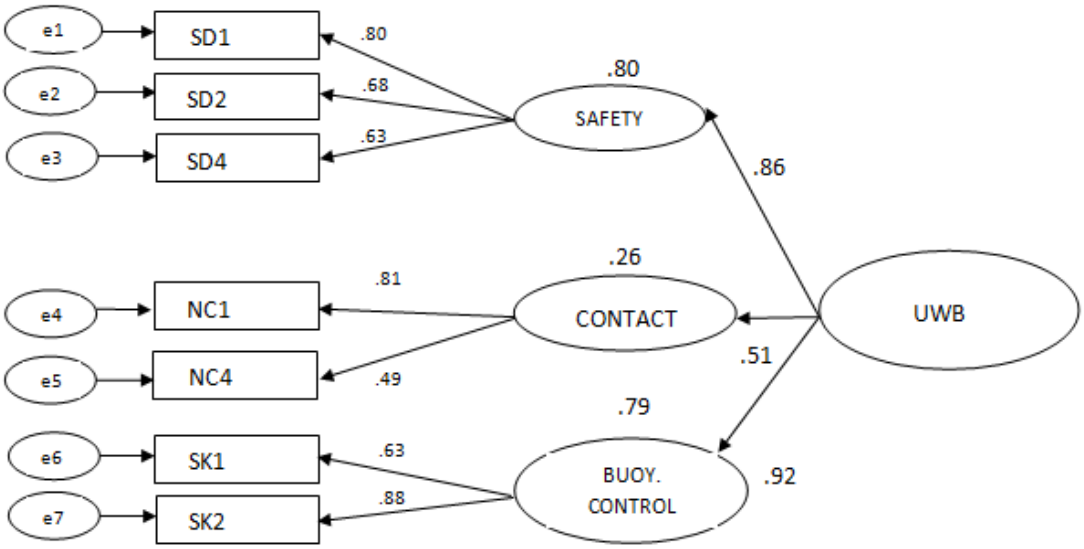

Figure 4.4: Result of Measurement Model for Divers' Underwater Behaviour

As a summary for the above analysis, the χ^2 statistics and the fit indices for each construct are as follows (Table 4.11):

Table 4.11: Fit Indices for Personality, Environmental Behaviour, Diving Attitude and Divers' Underwater Behaviour

Construct	χ^2	df	$p < .05$	χ^2/df	CFI	RMSEA	SRMR
Personality	121.40	60	.000	2.023	.968	.050	.029
Environmental concern	40.52	11	.000	3.083	.955	.081	.041
Diving attitude	16.43	11	.126	1.49	.996	.035	.020
Underwater behaviour	14.44	11	.210	1.31	.996	.028	.026

4.4 Descriptive Analysis of Constructs

The following section comprises various subsections which deal with descriptive analysis on the seven major constructs in relation to the respondents involved in the study. The constructs include experience level, personality, environmental concern, subjective norms, personal norms, diving attitude and underwater responsible behaviour.

4.4.1 Experience level

Experience level of respondents was represented by three parameters: 'total dives made', 'diving certification', and 'safe-rating experience', as shown in Table 4.12. All these parameters were given ratings, following which summation of the ratings produced a total score that determine the experience level of SCUBA divers.

In relation to total dives made, data analyses showed that more than half of the respondents (52.5%) have made less than 50 dives. About one-quarter of the respondents (25.9%) have made more than 200 dives. The group with 51-100 dives comprised of 11.4 % (47) of the respondents, and both the group with 101-150 dives and 151-200 dives, consisted of 5.1% (21) of the respondents respectively.

With regards to diving certification, the finding revealed that majority of the respondents (62%) comprised of Open Water divers (38%) and Advanced divers (24%). This was followed by the groups of Instructors (16.9%), Dive masters (11.9%) and Rescue divers (9.2%).

Table 4.12: Items Related to Experience of Respondents

Items	Frequency (N=413)	Percentage (%)
Total dives made		
<50	217	52.5
51-100	47	11.4
101-150	21	5.1
151-200	21	5.1
>200	107	25.9
Diving certification		
Open water	157	38.0
Advanced	99	24.0
Rescue diver	38	9.2
Dive master	49	11.9
Instructor	70	16.9
Self rating experience		
Beginner	160	38.7
Intermediate	160	38.7
Expert	93	22.5

As shown in Table 4.2, 38.7 % of the respondents rated themselves as beginners. An equal percentage of the respondents (38.7%) also rated themselves as intermediate divers. There were 22.5% of the respondents who considered themselves as expert divers.

The above three parameters of diving experience were given scores of 1 to 5, which were then totalled up. Composite scores ranged from lowest of 3 to the highest of 15 were calculated. The experience level of divers was categorised into three groups: low level (score of 3-6), medium level (7-10) and high level (11-15). As indicated in Table 4.13, the majority of the respondents (53.8%) were categorised as divers with low

experience level. Slightly more than one-quarter (28.1%) of the respondents were categorised as divers with high experience level, and 18.2% (75) of the respondents were considered as divers with medium level of experience.

Table 4.13: Experience Level of Respondents

Experience level	Frequency (N=413)	Percent (%)
Low (3-6)	222	53.8
Medium (7-10)	75	18.2
High (11-15)	116	28.1

Comparing the 'total dives made' by respondents (Table 4.2) with experience level, the percentage of divers that made 'less than 50 dives' (52.5%) were very close to the percentage of low experience divers (53.8%). At the same time, there is a close representation of percentage for high experience divers (28.1%) with divers that made more than 200 dives (25.9%). Therefore, the 'total number of dives made' by divers can be considered a good indicator that corresponds to divers' experience in diving.

4.4.2 Personality (PSN)

The Five Factor Model (FFM) (McCrae & John, 1992) was utilized to represent the personality traits of the respondents. The five personality traits in the FFM comprise neuroticism, extraversion, openness to experience, agreeableness and conscientiousness. Referring to Table 4.4, respondents with 'extraversion' possessed the highest personality mean scores of 3.957$\pm$.619 (M$\pm$SD), followed by 'openness to experience' (3.952$\pm$.643). Mean scores for personality traits of 'agreeableness' (3.828$\pm$.611), 'conscientiousness' (3.675$\pm$.729) and 'neuroticism' (2.314$\pm$.659) were rated lower

among respondents. The data suggest that the respondents (divers) are more likely to prevail or possess personality traits of

Table 4.14: Personality Dimension of Respondents

Personality Dimension	Mean (3.548)	SD (.717)	α (.640)
Neuroticism	2.314	.659	-.668
NU1_3 I rarely get irritated□* & seldom feel blue □	2.506	.740	
NU2_4 Comfortable with myself □ & not easily bothered by things □	2.122	.668	
Extraversion	3.957	.619	.939
EX1- Make friends easily	3.971	.791	
EX3- Handling social situations	3.826	.756	
EX4- Comfortable around people	4.075	.739	
Openness to experience	3.952	.643	.773
OP1_3 Vivid/strong imagination & enjoy hearing new ideas	4.116	.668	
OP2_4 Carry the conversation to a higher level & importance of arts	3.788	.740	
Agreeableness	3.828	.611	.894
AG2 - Good word for everyone	3.741	.784	
AG3 - Accept people as they are	3.823	.798	
AG5 - Make people feel at ease	3.920	.738	
Conscientiousness	3.675	.729	.518
CN2- Chores done right away	3.530	.974	
CN3- Carry out my plans	3.896	.804	
CN4- Stick to plans	3.600	.877	

Note: A 5-point Likert scale was used. Scale: 1 = strongly disagree; 5 = strongly agree.
□ negatively coded.

'extroversion', 'openness to experience' and 'agreeableness'. Comparatively, divers would be less likely to possess traits of 'neuroticism'. As shown in Table 4.4, Cronbach's alpha values for the five personality factors showed acceptable internal

consistency: extraversion (0.939), neuroticism (-.668), openness to experience (0.773), agreeableness (0.894) and conscientiousness (0.518).

4.4.3. Environmental concern

Based on New Ecological Paradigm (NEP) scale, environmental concern was represented by three dimensions namely, ecocentric, dualcentric and technocentric. As a whole, the mean score of respondents were higher for the dimension of ecocentric (4.053±.610), followed by dualcentric (3.831±1.024), and technocentric (2.285±1.029). Cronbach's alpha values of environmental concern dimensions showed acceptable internal consistency: ecocentric (.654), followed by dualcentric (.797), and technocentric (-.801).

Among the dimensions of environmental concern, respondents rated the first factor of 'ecocentric' highly in all the six items, from Mean=4.24 to Mean=4.02 (Table 4.15). This result indicated that divers strongly agreed that the environment is in a threatened state, and human impacts can lead to some form of disaster. In the dimension of 'dualcentric', all the two items have mean scores above the mid-point score of 3.0. Results indicated that respondents agreed that there exists an attitude of symbiotic dual equality between humans and the environment. In the dimension of 'technocentric', all two items have mean scores lower than 3.0. These results reflected that the divers somewhat disagreed that technological innovation can solve environmental issues and the 'ecological crisis' has been greatly exaggerated.

Table 4.15: Descriptive Analysis of Environmental Concern of Respondents

Environmental concern Dimension	Mean (3.516)	SD (.643)	α (.657)
Ecocentric	4.053	.710	.654
ENC3_11 – The earth is like a spaceship & humans produces disastrous consequences	3.862	.781	
ENC5_13 - The balance of nature is very delicate & humans are severely abusing the environment	4.117	.764	
ENC1_15 - The number of people the earth can support is limited & we will soon experience a major ecological disaster	4.179	.738	
Dualcentric	3.832	1.024	.797
ENC2- Humans have the right to modify the natural environment to suit their needs □	3.775	1.195	
ENC12- Humans are meant to rule over the rest of nature □	3.889	1.218	
Technocentric	2.285	1.029	-.801
ENC8- The balance of nature is strong enough to cope with the impacts of modern industrial nations	2.206	1.194	
ENC10-The so-called "ecological crisis" facing humankind has been greatly exaggerated	2.363	1.194	

Note: A 5-point Likert scale was used. Scale: 1 = strongly disagree; 5 = strongly agree.
□ reverse coded.

4.4.4 Subjective norms

In the moral Norm–Activation Theory (NAT) of altruism (Schwartz, 1973), subjective norms symbolize values and beliefs somewhat dictated by specific referents (family members, friends, neighbours, or social groups) in terms of how individual should behave. For the purpose of examining this construct, respondents were required to indicate the extent that certain individuals (i.e. diving buddies/partners, dive masters/instructors, and other diving friends) influence them in their behaving responsibly towards the marine life/environment while diving.

Table 4.16: Descriptive Analysis of Subjective Norms among Respondents

Construct (Items)	Mean (4.449)	SD (.567)	α
Subjective norms (SN)			.758
SN1 - diving buddies/partners	4.383	.699	
SN2 - dive masters/instructors	4.663	.536	
SN3 - other diving friends	4.300	.814	

Note: A 5-point Likert scale was used. Scale: 1 = not at all ; 5 = to a great extent.

As shown in Table 4.16, the resulted mean scores were: dive masters/instructors (4.663±.536), diving buddies/partners (4.383±.699), and other diving friends (4.300±.814). The findings revealed that dive masters/instructors have the greatest influence on divers' responsible behaviour while diving underwater. It was then followed by influence of diving buddies/partners and other diving friends.

4.4.5 Personal norms

Personal norms refer to an individual's belief that acting in a certain way is right or wrong. The fundamental feature of personal norms is internalization, whereby an individual's willingness to follow her/ his personal norms is based on his/her anticipation of negative self-related feelings such as regret or guilt after having broken her/his personal norms. Thus, it relates to an ascription of responsibility which may initiate actions to avoid adverse consequences which threaten others.

In this construct, respondents were to state their agreement to three items related to ascription of responsibility towards conservation of marine environment. As shown in Table 4.7, the respondents rated highly on all the three items, ranging from Mean=4.59 to Mean=4.06. The results indicated that divers had quite a strong sense of

responsibility towards conservation of the marine environment and they are willing to spend time participating in marine conservation activities on a regular basis.

Table 4.17: Descriptive Analysis of Personal Norms among Respondents

Constructs (Items)	Mean (4.327)	SD (.618)	α
Personal norms (PN)			.795
PN1 - I feel a strong personal obligation to conserve marine environment	4.327	.768	
PN2 - I would feel guilty if I did not behave responsibly towards the marine life/ environment in my dive	4.591	.646	
PN3 - I am willing to spend time participating in marine conservation activities on a regular basis	4.063	.786	

Note: A 5-point Likert scale was used. Scale: 1 = strongly disagree; 5 = strongly agree

4.4.6 Diving attitude

Diving attitude of divers was represented by three dimensions as illustrated in Table 4.18 below. Cronbach's alpha values of each dimension of diving attitude showed high

Table 4.18: Descriptive Analysis of Diving Attitude of Respondents

Diving attitude Dimension	Mean (3.350)	SD (.822)	α (.743)
Commitment	2.818	1.095	.864
COM1 - contributed money to marine/coral conservation program	2.656	1.318	
COM2 - keep track with current marine conservation issues	3.063	1.205	
COM3 - commit time to involve in marine conservation activities	2.736	1.353	
Knowledge on diving practice	4.079	.806	.717
DP2 - diving skills necessary for various types of dive	4.007	.936	
DP4 - usage and handling of underwater diving equipments	4.150	.849	
Knowledge on Regulation	3.153	1.109	.788
REG2 - marine conservation programs and activities	3.330	1.125	
REG3 - penalties for violating local marine parks regularly	2.973	1.266	

internal consistency: commitment (.864), knowledge on diving practice (.717) and knowledge on regulations (.788). In general, divers can be considered to possess positive diving attitude with mean score of more than 3.0 (3.350±.822). The result indicated that divers possessed highest mean score in knowledge on diving practice (4.079±.806), followed by knowledge on regulations (3.153±1.109), and commitment (2.818±1.095).

In the dimension of knowledge on diving practice, all the two items had high mean scores of 4.15±.849 and 4.01±.936. The result indicated that the divers had a good extent of knowledge concerning usage and handling of underwater diving equipments, which is fundamental to all divers. Besides, divers consider themselves to have substantial knowledge about diving skills necessary for various types of dive.

With regards to the dimension of knowledge on regulations, the results of mean scores for the two items were 3.33±1.13 and 2.97±1.27 respectively. This showed that divers, had a slightly low to average knowledge regarding marine conservation programs and activities. Comparatively, divers were less aware of penalties for violating local marine parks regulations.

In the dimension of commitment, the mean scores for the three items ranged from 3.06±1.21 to 2.66±1.32 (Table 4.18). The result indicated that divers were moderately involved in activities related to marine conservation. Basically, divers were still concerned and kept track of current marine conservation issues. To some extent, they did commit time to be involved in marine conservation activities and contributed money to marine/coral conservation program.

4.4.7 Underwater responsible behaviour.

Diver's underwater responsible behaviour was represented by three dimensions as shown in Table 4.9 below. Cronbach's alpha values for two dimensions of underwater responsible behaviour showed high internal consistency: safety diving behaviour (.745), and buoyancy control diving behaviour (.715). The dimension of non-contact diving behaviour poses marginal alpha value of .522. However, the overall internal consistency of the construct (underwater responsible behaviour) indicated a high level of Cronbach's alpha value of .783. To remedy the normality violation of the variables, the items in divers' underwater behaviour were transformed by 'cubing' the value of each variables involved. Thus, the lowest value for each item would be '1', the mid-point is '27 '(cube of 3), and the highest value would become '125'. (cube of 5). Therefore, with the mean score of 86.246$\pm$26.909, divers were considered to possess positive underwater responsible behaviour because the mean score is more than 27.0. The result indicated that divers possessed highest mean score in non-contact diving behaviour (101.05$\pm$30.49), followed by buoyancy control diving behaviour (84.138$\pm$37.16), and safety diving behaviour (79.896$\pm$33.919).

With regard to the dimension of non-contact diving behaviour, all the two items had high mean scores of 105.492$\pm$33.639 and 96.617$\pm$41.277 (Table 4.19). The result indicated that respondents generally were aware of and practised non-contact diving behaviour such as avoid standing, touching or resting on coral while diving.

In the dimension of buoyancy control diving behaviour, the two items also showed high mean scores of 84.174$\pm$41.805 and 84.102$\pm$42.45 (Table 4.19). The finding revealed that divers often maintain a safe distance from the reef and try to keep neutrally buoyant at all times. This behaviour would indicate that divers were practising the important

Table 4.19: Underwater Responsible Behaviour of Respondents

Underwater responsible behaviour dimension	Mean (86.246)	SD (26.909)	α (.783)
Safety diving behaviour	79.896	33.919	.985
SD1 - streamline all equipment underwater	77.630	47.169	
SD2 - practice good finning technique	80.058	44.229	
SD4 - check underwater position/orientation regularly	82.102	46.174	
Buoyancy control diving behaviour	84.138	37.160	.828
SK1 - maintain a safe distance from the reef	84.174	41.805	
SK2 - keep neutrally buoyant at all times	84.102	42.450	
Non-contact diving behaviour	101.05	30.490	.521
NC1 - stand or rest on coral *	105.492	33.639	
NC4 - touch coral*	96.617	41.277	

Note: Mean scores were transformed by the function of x^3 ('cubed')
*reverse coded.

skills emphasized and learned during their diving certification process. Indirectly, this would help to mitigate unnecessary damage to the reef.

In relation to the dimension of safety diving behaviour, all the four items revealed high mean scores which ranged from 82.102±46.174 to 77.63±47.169 (Table 4.19). The result indicated that divers possessed highest mean score in 'inspect SPG (submersible pressure gauge) reading from time to time' (82.102±46.174), followed by 'practice good finning technique' (80.058±44.229), 'check underwater position/orientation regularly' (79.794±42.580) , and finally 'streamlined all equipment underwater ' (77.630±47.169) . Together the findings suggest divers adhered to the safety priority and guidelines emphasized in the diving certification program, which in turn have a direct impact on their personal safety. Divers seemed to practice what they have

learned, and gave attention to details concerning safety while enjoying their diving activity.

4.5 Multivariate Assumptions

For further multivariate analysis, several assumptions are required to be met. Violation of assumptions may cause various problems, which include inaccurate results of significant coefficients and wrong prediction of dependent variables (Hair *et al.*, 2006)

4.5.1 Univariate normality, linearity and homoscedasticity

As discussed earlier, it is necessary to confirm the normality of each variable before proceeding with further analysis. Therefore, this procedure was performed by assessing the skewness and kurtosis of each variable. The threshold value of $\pm$ 1.0 was used as a guideline to determine the violation of normality (George & Mallery, 2003; Morgan *et al.*, 2001). All the variables fulfilled the suggested threshold value of skewness and kurtosis which ranged between +1.0 and -1.0, except for seven variables (SD1, SD2, SD4, SK1, SK2, NC1, NC4) in the underwater behaviour construct. The variables have values ranged from 1.684 to -1.803 which were above the threshold value of $\pm$ 1.0 for both skewness and kurtosis.

In order to remedy the normality violation of the variables, data transformation was conducted. All the seven variables in the underwater construct were subjected to similar data transformation, to avoid difficulty in the interpretation process (Field, 2005). The items were transformed by 'cubing' the value of the variables involved. The transformation successfully reduced the skewness and kurtosis value of the seven variables to lie between the acceptable range between +1.0 and -1.0. Although skewness and kurtosis were still present, all the variables in the constructs now fulfilled the

Table 4.20: The Levels of Skewness and Kurtosis for All Variables

Variables	Min	Max	Skewness	Kurtosis
EXP1	1.00	5.00	.649	-.972
EXP2	1.00	5.00	.598	.947
EXP3	1.00	5.00	.284	.949
SN1	1.00	5.00	-.341	.930
SN2	1.00	5.00	-.916	-.505
SN3	1.00	5.00	.216	.942
PN1	1.00	5.00	-.679	-.944
PN2	1.00	5.00	-.911	-.050
PN3	1.00	5.00	-.494	-.990
NU2_13	1.00	5.00	.294	.171
NU4_14	1.00	5.00	.530	.564
EX1	1.00	5.00	-.408	.591
EX3	1.00	5.00	-.308	.029
EX4	1.00	5.00	-.590	.508
OP1_3	1.00	5.00	-.833	.975
OP2_4	1.00	5.00	-.524	.480
AG2	1.00	5.00	-.267	.028
AG3	1.00	5.00	-.989	.942
AG5	1.00	5.00	-.972	.927
CN2	1.00	5.00	-.401	-.161
CN3	1.00	5.00	-.482	.178
CN4	1.00	5.00	-.319	-.194
ENC3_11	1.00	5.00	-.398	-.095
ENC5_13	1.00	5.00	-.657	.040
ENC1_15	1.00	5.00	-.700	.182
ENC2	1.00	5.00	-.798	.108
ENC12	1.00	5.00	-.869	-.243
ENC8	1.00	5.00	.832	-.215
ENC10	1.00	5.00	.522	-.648
DP2	1.00	5.00	-.726	.068
DP4	1.00	5.00	-.791	.215
REG2	1.00	5.00	-.145	-.785
REG3	1.00	5.00	.079	-.908
COM1	1.00	5.00	.230	-.965
COM2	1.00	5.00	-.021	-.797
COM3	1.00	5.00	.222	-.921
SD1	1.00	125.00	-.247	-.936
SD2	1.00	125.00	-.239	-.980
SD4	1.00	125.00	-.201	-.934
SK1	1.00	125.00	-.375	-.940
SK2	1.00	125.00	-.366	-.934
NC1	8.00	125.00	-.915	.098
NC4	8.00	125.00	-.957	-.140

condition of acceptable normality. Therefore, it can be concluded that univariate normality was assumed in each of the variables adopted in this study. Table 4.20 illustrates the levels of skewness and kurtosis for all the variables (including all the transformed underwater behaviour variables) in this study.

To examine the existence of linearity, the variables were evaluated using normal probability plot of the regression standardized residual. Analysis was performed on the linear relationship between personal factors and attitude (Figure 4.5), attitude and underwater behaviour (Figure 4.6) and the association between normative variables and underwater behaviour (Figure 4.7). The scatterplot provides information on homoscedasticity of the variables.

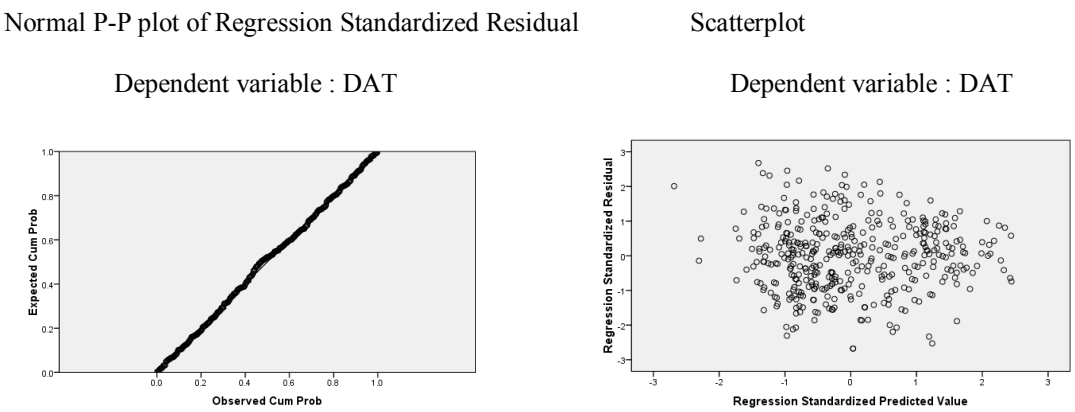

Figure 4.5: The Relationship between Personal Factors and Attitude

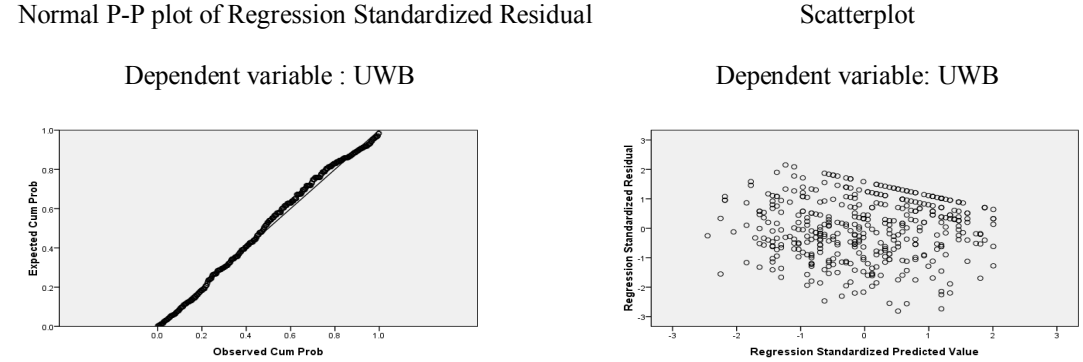

Figure 4.6: The Relationship between Diving Attitude and Underwater Behaviour

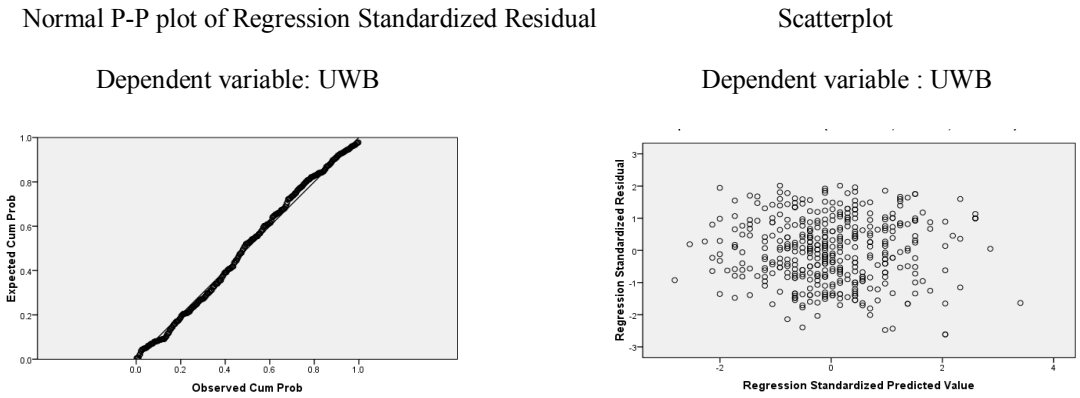

Figure 4.7: The Relationship between the Normative Variables and Underwater Behaviour

As shown in Figure 4.5, 4.6 and 4.7, there were no clear indications of non-linearity (i.e., the dots are far away from the straight-line). This means that linear relationships exist between the related independent variables and the dependent variable. From the scatterplot, a condition of homoscedasticity was observed (the dots are spread out across the graph, not concentrated in the center). No extreme outliers were identified as all the cases were well located in the specified residual range of between 3.3 and -3.3. The results indicated the condition of linearity and homoscedasticity were met in the relationship between the independent and dependent variables.

4.5.2 Multicollinearity

As discussed earlier, multicollinearity among independent variables can be evaluated by the Tolerance and VIF values, using the analysis of multiple regression between the independent and dependent variables. A tolerance value of less than 0.1 and VIF value of more than 10 would indicate the possibility of multicollinearity. However, the following results revealed that the Tolerance and VIF values in all the variables were well within the cut-off point mentioned. Therefore, it can be concluded that the problem of multicollinearity did not exists among the variables.

Table 4.21: Tolerance and VIF Values of Personality

Factors	Collinearity Statistics	
	Tolerance	VIF
Neuroticism	.724	1.382
Extraversion	.600	1.668
Openness to experience	.716	1.396
Agreeableness	.581	1.721
Conscientiousness	.855	1.170

Dependent variable: Personality

Table 4.22: Tolerance and VIF Values of Environmental Concern

Factors	Collinearity Statistics	
	Tolerance	VIF
Ecocentric	.928	1.077
Dualcentric	.777	1.287
Technocentric	.775	1.291

Dependent variable: Environmental concern

Table 4.23: Tolerance and VIF Values of Diving Attitude

Factors	Collinearity Statistics	
	Tolerance	VIF
Commitment	.633	1.581
Dive practice	.747	1.338
Regulation	.566	1.767

Dependent variable: Diving attitude

Table 4.24: Tolerance and VIF Values of Underwater Behaviour

Factors	Collinearity Statistics	
	Tolerance	VIF
Buoyancy control diving	.741	1.349
Safety diving	.754	1.326
Non-contact diving	.941	1.062

Dependent variable: Underwater behaviour

4.6 Measurement Model

Confirmatory factor analysis (CFA) was again used to validate the overall measurement model. For the purpose of improving the psychometric properties of the measures, CFA on all of the variables was simultaneously run again. Figure 4.8 represents the path diagram of the measurement model.

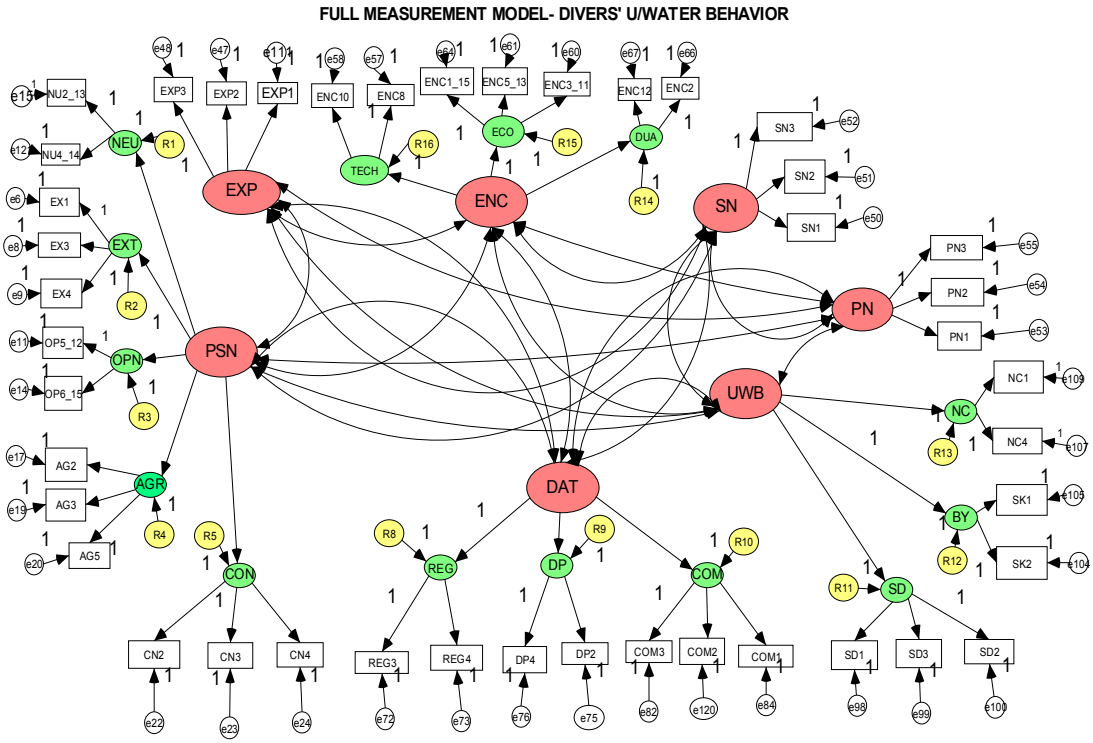

Figure 4.8: The Full Measurement Model

The analysis on the measurement model was used to evaluate the proposed model's unidimensionality, construct reliability and construct validity.

4.6.1 Unidimensionality

To determine the unidimensionality, the results of goodness-of-fit, direction of paths and the respective significant levels of individual variables were examined.

4.6.1a Goodness-Of-Fit (GOF)

Fit indexes describe and evaluate the residuals that result from fitting a model to the data. The goodness-of-fit indices resulted from the CFA on the overall measurement model is illustrated in Table 4.25.

Table 4.25: Fit Indices for Measurement Model

Construct	χ^2	df	p < .05	χ^2/df	CFI	RMSEA	SRMR
Measurement Model	1453.08	829	.000	1.753	.917	.043	.064

The model of this study produced a χ2value of 1453.08, with 829 degrees of freedom. The p-value obtained was .000, and significant at p=.05. The large χ2 value and significant p value indicate that the observed sample is not significantly equal to the SEM estimated covariance matrices. Thus, reflecting an unfit model. However, numerous researchers have recommended caution in using χ2 statistics indices as the only determinants for testing model fit (Byrne, 2006; Hair *et al.*, 2006). It has been noted that Chi-square test is subjected to many limitations (Hair, et al., 2006; (Jöreskog & Sörbom, 1993); (Schumacker & Lomax, 2004), as it is affected by the following factors: (1) sample size - larger samples produce larger chi-squares, thus non-significant chi-square when samples sizes are much over 200 or so; (2) model size -models with more variables tend to have larger chi-squares; (3) distribution of variables- highly skewed and kurtotic variables increase chi-square values. To address the limitations of chi-square test, goodness-of-fit indexes as adjuncts to the chi-square statistic are recommended to assess model fit. In this study, the following fit indices were used: relative chi-square (χ^2/df), comparative fit index (CFI), the root mean square error of approximation (RMSEA), and the standardized root mean square residual (SRMR). Relative chi-square (χ^2/df) is a fit index that can make χ2 less dependent on sample size.

Different researchers have recommended using ratio as low as 2 or as high as 5 to indicate a reasonable fit (Kline, 2005); Marsh & Hocevar, 1985; (Tabachnick & Fidell, 2007). The value of χ^2/df in the present model is 1.75, which falls much below the recommended value of 5.0, indicated that it has achieved an adequate fit.

As described earlier in section 4.3.2, CFI value that is equal or greater than 0.9 or close to 0.95 would indicate good fit. The CFI value for the current model is .917 which satisfies the CFI requirement.

In the case of RMSEA, value equal or less than .06 ($\leq$ .06) is the cut-off for a good model fit (Hu & Bentler, 1999). The RMSEA value for the proposed model was .043, which means only about 4.3% of the variances were left unexplained. This indicates the model has a good fit.

As for SRMR, the smaller the SRMR, the better the model fit. A value less than .08 is considered good fit (Hair, *et al.*, 2006). With SRMR value of .064, the proposed model can be considered good fit. On the whole, the multiple fit indices (χ^2 =1453.08, df=829; χ^2/df=1.75, CFI=.917, RMSEA=.043, SRMR= .064) have indicated that the proposed measurement model fit the data quite well.

4.6.1.b Direction of paths and the respective significant levels

As shown in Table 4.26, all items exhibit positive directions and were statistically significant with t value (C.R.) $\geq$ 1.96 (Byrne, 1998). The results support the existence of unidimensionality of the items used in the model. The goodness-of-fit and regression weight result further confirm the presence of unidimensionality in the present model.

Table 4.26: Regression Weights of Constructs

			Estimate	S.E.	C.R.	P
EXP1	<---	EXP	1.207	.048	25.005	***
EXP2	<---	EXP	1.052	.043	24.538	***
EXP3	<---	EXP	1.000			
SN1	<---	SN	.995	.049	20.404	***
SN2	<---	SN	.660	.041	15.999	***
SN3	<---	SN	1.000			
PN1	<---	PN	1.241	.100	12.431	***
PN2	<---	PN	1.000			
PN3	<---	PN	1.047	.090	11.632	***
NEU	<---	PSN	-.717	.089	-8.032	***
EXT	<---	PSN	1.000			
OPN	<---	PSN	.856	.082	10.445	***
AGR	<---	PSN	.967	.076	12.813	***
CON	<---	PSN	.721	.097	7.442	***
ECO	<---	ENC	1.000			
DUA	<---	ENC	1.286	.212	6.075	***
TEC	<---	ENC	-1.928	.351	-5.484	***
COM	<---	DAT	1.119	.086	12.950	***
DP	<---	DAT	.619	.061	10.085	***
REG	<---	DAT	1.000			
SD	<---	UWB	1.759	.203	8.677	***
BY	<---	UWB	1.000			
NC	<---	UWB	.432	.090	4.779	***

4.6.2 Construct reliability

Construct reliability of the variables in the study was assessed by examining the item reliability (squared multiple correlation), composite reliability and average variance extracted. The following result (Table 4.19) illustrates the item reliability (R^2) value, which indicates the amount of variance that is accounted for by the latent variable associated with the item. Generally, $R^2 \geq .5$ is considered a cut-off point to represent a reliable item or construct. As revealed in Table 4.27, five indicators were found to have lower reliability (CN=.260, NU=-.446, ECO=.436, NC=.218, PN3=.485). However, these defects were considered acceptable as not only the linking paths between these

Table 4.27: Standardized Regression Weights, Composite Reliability and Average Variance Explained of Each Constructs

Items	Std. Reg. Weight	P	R^2	CR	AVE
Experience (EXP)				.92	.80
EXP1	.917	***	.841		
EXP2	.912	***	.832		
EXP3	.851	***	.724		
Personality (PSN)				.87	.58
OP	.773	***	.597		
CN	.510	***	.260		
EX	.939	***	.882		
AG	.894	***	.799		
NU	-.668	***	.446		
Environmental concern (ENC)				.80	.57
ECO	.660	***	.436		
DUA	.791	***	.626		
TEC	.799	***	.638		
Diving attitude (DAT)				.84	.64
REG	.811	***	.656		
DP	.715	***	.512		
COM	.866	***	.750		
Underwater behaviour (UWB)				.80	.60
BY	.819	***	.670		
SD	.996	***	.992		
NC	.518	***	.268		
Subjective norms (SN)					
SN1	.905	***	.820	.87	.69
SN2	.709	***	.503		
SN3	.867	***	.750		
Personal norms (PN)				.79	.56
PN1	.804	***	.645		
PN2	.736	***	.542		
PN3	.696	***	.485		

items and their respective latent variables indicated significant p-values (p=<.001), the remaining variables also produced R^2 value greater than .5, ranging from .503 to .992. Hence, the model is claimed to have marginal construct reliability.

Average variance extracted (AVE) represents the average amount of variances in the indicators that are accounted for by the underlying factor (Fornell & Larcker, 1981). A variable is considered reliable if its AVE attains .5 or above (Lu et al, 2007). From the results shown in Table 4.27, all variables have attained AVE higher than .50. This means that at least 50% or more of the variances in the observed variables are explained by the set of indicators.

Composite reliability (CR) indicates the extent to which a set of indicators are consistent in their measurement of the same construct (Lu, *et al.*, 2007). According to Nunnally (1978), a scale with CR value of .6 or above is considered to acquire reasonable internal consistency. The result in Table 4.19 indicated good CR values for all variables, which ranged from .79 to .92.

4.6.3 Construct validity

Construct validity of the variables in the present study were examined in two aspects, that is the convergent validity and the discriminant validity. Convergent validity indicates the extent to which items of a specific construct converge or share a high proportion of variance in common (Hair, *et al.*, 2006). On the other hand, discriminant validity represents the extent to which a construct is truly distinct from other constructs. The examination of convergent validity is assessed by referring to the standardized regression weight (standardized factor loading). Generally, the recommended value of .70 and above is accepted for the indication of convergent validity. Referring to the result in Table 4.19, the standardized regression weight values of the variables ranged from .51(CN) to .996 (SD). However, Hair *et al*.(2006) allow for a minimum value of .50 as long as the overall fit of the model remains acceptable (Byrne, 1998); Lu, *et al.,*

2007). With the positive significant levels and reasonable factor loading obtained, the presence of convergent validity among the constructs is still acceptable.

Table 4.28 illustrates the squared multiple correlation (SMC) matrix used for the purpose of assessing discriminant validity. There are few ways to assess discriminant validity between constructs. These include: conducting a paired construct test (Joreskog, 1971), apply the Fornell and Larcker (1981) technique, or conduct a multi-trait multi-method evaluation of constructs (Farrell & Rudd, 2009). Among these methods, Farrell (2009) recommended that Fornell and Larcker (1981) technique represents the best method to apply. This technique is also supported by Hair *et al.* (2006, p.778), noting that "the variance extracted estimates should be greater than the squared correlation estimate". In relation to this, the discriminant validity of the constructs were assessed by the Fornell and Larker (1981) technique. The AVE scores were written diagonally and it was used to compare with the squared correlation values. If the AVE scores are higher than the squared correlations values, discriminant validity is said to be present. From the result given, the lowest AVE score was .570 (ENC). However, there were no squared correlations that were higher than this value. Hence, this shows the existence of

Table 4.28: Results of Average Variance Extracted and Squared Correlation of Each Constructs

	DAT	UWB	ENC	PSN	EXP	PN	SN
DAT	.639						
UWB	.314	.600					
ENC	.002	.014	.570				
PSN	.082	.081	.001	.580			
EXP	.367	.449	.010	.025	.799		
PN	.013	.060	.008	.018	.027	.557	
SN	.003	.025	.002	.041	.003	.117	.691

discriminant validity among the constructs, whereby all the seven variables are distinct from each other.

4.7 Structural Model

After validating the proposed model with CFA, SEM was used to test the proposed

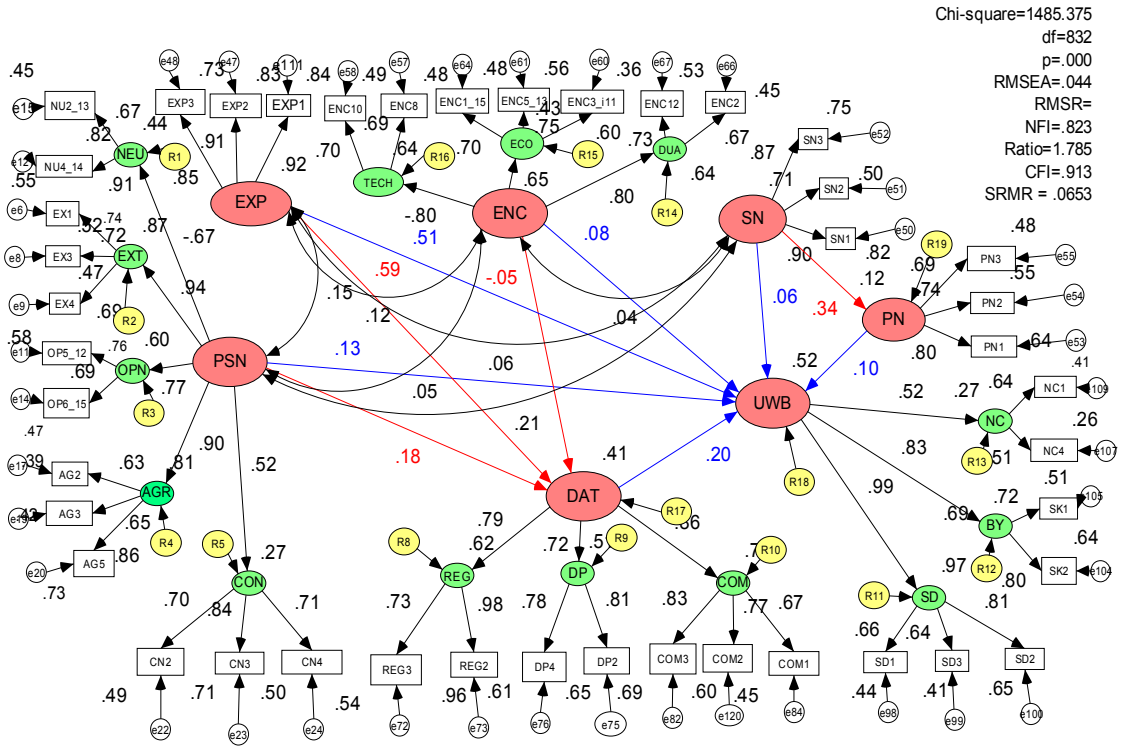

Figure 4.9: The Proposed Structural Model

hypothesis. The result of the SEM analysis on the path diagram of the structural model, proposed in the current study is shown in the Figure 4.9. Referring to Table 4.29, all the fit indices seem to meet and supersede the cut-off values conventionally recommended in the literature (Hair *et al.*, 2006; Tabachnick & Fidell, 2007), except for the non-significant p-value. As mentioned earlier, this situation is common when a sample size is larger than 200 (Anderson & Gerbing, 1988). Thus, it can be concluded that the fit of the proposed model was reasonably good.

Table 4.29: Fit Indices for Measurement Model

Construct	χ^2	df	p < .05	χ^2/df	CFI	RMSEA	SRMR
Measurement Model	1485.37	832	.000	1.785	.913	.044	.065

4.7.1 Hypothesis testing

The results of the structural coefficients indicated in Figure 4.9 were used to examine the following hypothesis:

H1a: Experience level has a significant relationship with divers' underwater behaviour

The path that connects experience level to underwater diving behaviour generated a coefficient value of .508 which was significant at .05 alpha (S.E= 1.473; C.R=7.042). This result indicated that experience has a significant relationship with divers' underwater behaviour. The result supported H1a.

H1b: Personality has a significant relationship with divers' underwater behaviour

The link between personality and divers' underwater behaviour was indicated by a coefficient value of .125 which was significant at .05 alpha (S.E=3.010; C.R= 2.403). This means that personality has a significant relationship with divers' underwater behaviour. The result supported H1b.

H1c: Environmental concern has a significant relationship with divers' underwater behaviour

The coefficient value for the path from environmental concern to divers' underwater behaviour was .080 which was not significant at .05 alpha (S.E= 4.465; C.R= 1.246;

p=.154). Hence, H1c was not supported, revealing that there was no significant relationship between environmental concern and divers' underwater behaviour.

As a whole, only two paths from the above construct i.e. experience and personality, related to divers' underwater behaviour were significant, which support the respective hypothesis (H1 and H2). The environmental concern construct does not possess a significant relationship with divers' underwater behaviour, thus does not support H3. Among these significant paths, experience has the highest coefficient value, β=.508. This was followed by personality (β=.125). The result implies that the strongest predictor of divers' underwater behaviour was experience level, and followed by personality.

H2: Diving attitude has a significant relationship with underwater behaviour of divers

The relationship between diving attitude and underwater responsible behaviour was also shown to be significant at .05 alpha with coefficient value of .200 (S.E= 2.663; C.R= 2.709). The result provided evidence that diving attitude has a significant relationship with underwater responsible behaviour. Thus, supporting hypothesis 2.

For the next three hypotheses (H3a, H3b, and H3c), the Sobel Test (http://www.danielsoper. com/statcalc/calc31.aspx) was used to determine the indirect effect, and the significant mediating effect of diving attitude in the relationship between the three constructs (i.e experience, personality, and environmental concern) and underwater responsible behaviour. The Sobel test calculation involve both the coefficient (β) and standard error (S.E.) values between independent variables and mediator variables (diving attitude), and also mediator variable and dependent variable

(underwater responsible behaviour). Hence, the Sobel test is able to indicate whether a mediator variable significantly carries the influence of an independent variable to a dependent variable; i.e., whether the indirect effect of the independent variable on the dependent variable through the mediator variable is significant. For hypothesis testing purpose, Table 4.30 provides the parameter estimates of the related paths and the Sobel test result.

Table 4.30: The Coefficient Value, Standard Error and Sobel Test Result for the Mediation Effects of Diving Attitude

Observed relationship	Direct path (β)	S.E	C.R.	p	Indirect path (β)	Sobel test statistics	Probability (one-tailed)
EXP → DAT	.590	.038	8.819	**			
PSN → DAT	.181	.107	3.473	**			
ENC → DAT	-.052	.221	-1.626	.104			
DAT → UWB	.200	2.663	2.709	**			
EXP → UWB	.508	1.473	7.042	**			
PSN → UWB	.125	3.010	2.403	*			
ENC → UWB	.080	4.465	1.426	.342			
EXP → DAT →UWB					.118	5.372	**
PSN → DAT →UWB					.010	.075	.047*
ENC → DAT →UWB					.004	--	--

*p<.05, **p<.01

H3a: Diving attitude mediates the relationship between experience level and underwater behaviour of divers

As shown in Table 4.22, both direct effects from experience to diving attitude (β=.590) and diving attitude to underwater responsible behaviour (β=.200) were significant (p< .01). Using Sobel test, the magnitude of the indirect coefficient value was .118. The

indirect effect of experience → diving attitude → responsible underwater behaviour relationship, was found to be significant ($p<.05$) with Sobel statistic value of 5.372. The result reveals that diving attitude has a significance mediating effect on the relationship between experience level and underwater responsible behaviour. Thus, H3a was supported. Since experience has a significant relationship with underwater responsible behaviour ($\beta=.508$; S.E= 1.473; C.R= 7.042; $p<.01$), diving attitude can be considered as a partial mediator in the relationship between experience level and underwater responsible behaviour.

H3b: Diving attitude mediates the relationship between personality and underwater behaviour of divers

Significant relationships were observed between personality and diving attitude ($\beta=.181$; $p< .01$), subsequently also between diving attitude and underwater responsible behaviour ($\beta=.200$; $p<.05$). Based on Sobel Test, the magnitude of the indirect coefficient value obtained was .023. The indirect effect of personality → diving attitude → responsible underwater behaviour relationship, was found to be significant ($p<.05$) with Sobel statistic value of .075. This shows that diving attitude has a significant mediating effect on the relationship between personality and underwater responsible behaviour. Thus, H3b was supported. It was observed that personality has a significant relationship with underwater responsible behaviour ($\beta=.125$; S.E= 3.010; C.R= 2.403; $p<.05$). Therefore, diving attitude portrays a partial mediator role in the personality and underwater responsible behaviour relationship.

H3c: Diving attitude mediates the relationship between environmental concern and underwater behaviour of divers

As indicated in Table 4.22, the paths between environmental concern and underwater responsible behaviour (β=.080) was not significant. The relationship between environmental concern and diving attitude was also weak and not significant (β= -.052, p=.419 > .05). Though diving attitude and underwater responsible behaviour (β=.200) have a significant relationship (p<.05), environmental concern was not significantly related to both the variables. The Sobel test showed a weak indirect coefficient value of .010. However, the indirect effect of environmental concern → diving attitude → responsible underwater behaviour relationship, was not significant (p>.05). The result indicated that diving attitude fails to have a significant mediating effect on the relationship between environmental concern and underwater responsible behaviour. Thus, H3c was not supported.

H4: Subjective norms have a significant relationship with divers' underwater responsible behaviour

The coefficient value for the path from subjective norms to underwater responsible behaviour was .058 and this was not significant at .05 alpha level (S.E= .038; C.R= 1.140). Hence, H4 was not supported, revealing that there was no significant relationship between subjective norms and underwater behaviour of divers.

H5: Personal norms have a significant relationship with underwater responsible behaviour of divers

The link between personal norms and underwater responsible behaviour was indicated by a coefficient value of .105 which was significant at .05 alpha (S.E= .056; C.R= 1.961). This means that personal norms have a significant relationship with underwater responsible behaviour. Hence, the result supported H5.

H6: Personal norms mediate the relationship between subjective norms and underwater behaviour of divers

As shown in Table 4.31, both direct effects from subjective norms to personal norms (β=.345) and personal norms to underwater responsible behaviour (β=.105) were significant (p<.05). Based on Sobel Test, the magnitude of the indirect coefficient value was .036. The indirect effect of subjective norms → personal norms → responsible underwater behaviour relationship, was found to be significant (p<.05) with Sobel statistic value of 1.92. The result indicates that personal norms have a significant mediating effect on the relationship between subjective norms and underwater responsible behaviour. Thus, H6 was supported.

Table 4.31: The Coefficient Value, Standard Error and Sobel Test Result for the Mediation Effects of Personal Norms

Observed relationship	Direct path (β)	S.E	C.R.	p	Indirect path (β)	Sobel test statistics	Probability (one-tailed)
SN → PN	.345	.044	5.590	**			
PN → UWB	.105	.056	1.961	.050*			
SN → UWB	.058	.038	1.140	.254			
SN → PN →UWB					.036	1.92	*

**p<.01

Nevertheless, the relationship between subjective norms and underwater responsible behaviour was weak and not significant (β=.058; S.E= .038; C.R= 1.140; p=.254>.05). Therefore, it can be concluded that personal norms have a full mediation effect in the subjective norms and underwater responsible behaviour relationship. This means that the influence of subjective norms on underwater responsible behaviour is indirect, by going through the influence personal norms.

As a summary, ten hypotheses were tested and three of the hypotheses were not supported. Among the three personal factors, experience was found to be the most prominent predictor of divers' underwater responsible behaviour, and followed by personality factor. Environmental concern did not show significant influence on divers' underwater responsible behaviour. The influence of diving attitude on divers' underwater responsible behaviour is relatively strong (β= .200). It also plays an important mediator role in the relationship between experience, personality and divers' underwater responsible behaviour. In the case of the normative variables, personal norms play an important role as prominent predictor, and also act as mediator for the relationship between subjective norms and divers' underwater behaviour. The proposed mediating effects of diving attitude and personal norms on underwater behaviour and related variables were validated. Below is the summary of the hypotheses testing discussed earlier.

Table 4.32: A Summary of Hypothesis Testing

Hypothesis Number	Hypothesis	Results
H1a	Experience level has a significant relationship with divers' underwater responsible behaviour	Supported
H1b	Personality has a significant relationship with divers' underwater responsible behaviour	Supported
H1c	Environmental concern has a significant relationship with divers' underwater responsible behaviour	Not supported
H2	Diving attitude has a significant relationship with underwater behaviour of divers	Supported
H3a	Diving attitude mediates the relationship between experience level and underwater behaviour of divers	Supported
H3b	Diving attitude mediates the relationship between personality and underwater behaviour of divers	Supported
H3c	Diving attitude mediates the relationship between environment concern and underwater behaviour of divers	Not Supported

H4	Subjective norms have a significant relationship with underwater responsible behaviour	Not Supported
H5	Personal norms have a significant relationship with underwater behaviour of diver	Supported
H6	Personal norms mediate the relationship between subjective norms and underwater behaviour of divers	Supported

4.8 Summary

A total of 413 cases were used as samples for the present study. The pilot study was conducted and followed by scale purification process which involved the analysis of the item-to- total correlation, Cronbach's Alpha and exploratory factor analysis (EFA). To avoid violation of several multivariate assumptions, the data were further examined involving values of standardized residual and scatter plots. CFA was conducted to verify the construct reliability and validity. The proposed model showed good fit with the data as the values obtained were above the minimum standards recommended in several multiple fit indices (χ^2=1485.37, df=832, χ^2/df=1.785, CFI=.913, RMSEA=.044, SRMR=.065). The positive results of unidimensionality, construct reliability and validity further support the appropriateness of the proposed model with the given data. Lastly, the paths in the structural model were analyzed using SEM. The analysis revealed that three of the ten hypotheses were not supported. The next chapter will proceed with further discussion on the above findings.

CHAPTER 5: DISCUSSION OF RESULTS AND CONCLUSION

5.1 Introduction

This chapter discusses the findings of the study with respect to research objectives and hypotheses established earlier. The following sections discuss the implications of the study's findings to both knowledge and practice. Limitations of the study are highlighted and suggestions for future research are presented in the final section.

5.2 Discussion

The escalating development of the dive tourism industry has roused increasing concern about the detrimental impacts that could potentially be caused by divers to the marine environment. Studies on the impacts of divers on the marine environment have been examined via various approaches. Among these are the examination of the carrying capacity of dive sites, the identification of divers' demographic and behaviour characteristics, and the different types of intervention that may alter divers' underwater behaviour. Although many of the impacts of divers' underwater behaviours have been investigated, the understanding on the influence of 'social psychological' variables on divers' underwater behaviour is still relatively unexplored. Hence, for the purpose of expanding the literature of consumer environmental behaviour, particularly in the area of SCUBA diving, the present study has achieved the following objectives.

5.2.1 Objective 1

Objective 1 - To examine the personal factors (experience level, personality, and environmental concern) that influence SCUBA divers underwater responsible behaviour

In explaining the influences on pro-environmental behaviour, Stern (2000) had proposed four types of causal variables which include personal capabilities, attitudinal factors, habit or routine, and external or contextual factors. The personal capabilities consist of factors such as the individual's knowledge, skill, available time and money, social status, and power. Attitudinal factors are environmental and non-environmental attitudes, beliefs, values, and personal norms. Habit or routine represents the tendency to act without thoroughly considering the behavioural choice. Stern (2000) pointed out that attitudinal factors and habit or routine may be classified as psychological factors. Lastly, the external or contextual factors comprise physical, social, economic, and political variables. However, the importance of socio-psychological factors over and above socio-demographic factors has been supported by numerous researches (Boldero, 1995; Hunecke *et al.*, 2007; Steg *et al.*, 2001). Based on previous literature, related socio-psychological variables such as experience, personality, and attitude were considered in this study to be prominent antecedents to explaining SCUBA divers' underwater responsible behaviour. Hines *et al.* (1987) outlined attitudes into two types, namely general attitudes towards the environment and specific attitudes towards ecological behavior. Therefore, attitude was examined as environmental concern (general attitudes towards the environment) and diving attitude (specific attitudes towards ecological behaviour) in the present study. Consequently, experience, personality and environmental concern were recognised as personal factors that influence diving attitude.

As mentioned earlier, three socio-psychological variables, i.e. experience, personality and environmental concern were selected to represent personal factors. The underlying premise of the first proposition is that the higher the level of personal factors, the more likely the divers will exhibit positive diving attitude. That is to say there is a strong

relationship between these two variables. Utilizing SEM, the results for each of the following hypothesis are discussed as follows.

H1a: Experience level has a significant relationship with divers' underwater behaviour

The significant coefficient value of .51 indicated that experience has a relatively strong positive relationship with divers' underwater behaviour. The result provided evidence that experience, which was represented by total frequency of dives completed, diving certification, and self-rating level, has a reasonably strong influence on the underwater behaviour of divers. This means that as divers' experience level increases, the more positive would be the divers' underwater behaviour. Among the three indicators, total frequency of dives completed (r=.917) has the highest influence on divers' underwater behaviour, followed by diving certification (r=.912), and self-rating level (r=.851).

The current study finds that experience, which largely is related to skill and knowledge, has the greatest influence on the underwater behaviour among divers. The result is consistent with several findings in SCUBA diving literature, whereby level of divers' experience directly influence underwater behaviour (Musa *et al.*, 2011; Rouphael & Inglis, 1997; Todd, 2000). Similar results have also been discovered in other specific activities such as recreational boating (Cottrell & Graefe, 1997) and hunting (Rossi & Armstrong, 1999), all of which revealed that experience was a significant predictor of specific responsible environment behaviour.

H1b: Personality has a significant relationship with divers' underwater behaviour

The significant relationship between personality and diving attitude was represented by coefficient value of .120, indicating that personality has a positive relationship with

diving attitude. The finding reveals that the five broad dimensions of personality traits i.e. extraversion, agreeableness, conscientiousness, neuroticism, and openness to experience can influence divers' underwater behaviour. The result shows that all dimensions are positively related to diving attitude, except neuroticism. This also means that divers with higher extraversion, agreeableness, conscientiousness, and openness to experience traits demonstrate more positive diving attitude, except for neuroticism.

Literature has shown that positive relationship exists between personality and various pro-environmental behaviours such as energy saving, purchasing eco-friendly products and ecological use of pro-environmental products (Balderjahn, 1988). Extraversion and responsible characteristics were found to be good predictors of consumers' real commitment with the environment (Witt, 2002); (Fraj & Martinez, 2003). Among SCUBA divers, Musa *et al.* (2011) reported that agreeableness and neuroticism are two significant predictors of divers' underwater behaviour among the five personality traits. It was clarified that agreeable people are more responsible (Letzring, 2008), thus portraying a positive underwater behaviour.

In the present study, it was observed that the personality traits of agreeableness (ß=.884), extraversion (ß=.856), and openness to experience (ß=.843) were identified as dominant characteristics of divers which could influence diver's underwater behaviour. Two of the identified personality traits, agreeableness and extraversion, were found to be consistent with previous studies as mentioned earlier (Witt, 2002); (Fraj & Martinez, 2003). Extraversion possesses sociable and affectionate characteristics which is concurrent with the tendency to portray responsible behaviour while diving underwater. As agreeableness individuals are generally altruistic, considerate, caring and responsible, it would be expected of them to exhibit underwater responsible behaviour.

The finding revealed that personal characteristics of divers are crucial information not to be neglected in the promotion of underwater responsible behaviour. Awareness and comprehension of individual diver's personality could help dive masters/instructors to understand and monitor diver's underwater behaviour more effectively.

H1c: Environmental concern has a significant relationship with divers' underwater behaviour

With a coefficient value of .062, the result showed that there is a very weak relationship between environmental concern and divers' underwater behaviour. This is to say that environmental concern does not possess a significant influence on divers' underwater behaviour ($p>.05$). As reviewed by Bamberg (2003), previous studies have shown weak relationship between general attitude (environmental concern) and specific environmental behaviours. Furthermore, the explanatory power of the environmental concern concept towards specific behaviour is questionable. As the relationship between environmental concern and underwater behaviour is not significant, the current finding supports the postulation of Ajzen and Fishbein (1980), which suggested that general attitudes such as environmental concern are not suitable to be used as direct determinants of specific behaviours. As a substitute, the attitude towards a specific behaviour itself is recommended to be considered a better direct determinant of a specific behaviour (Weigel, 1983). Ajzen and Fishbein (1977) explained that substantial relationship between attitude and behaviour will exist, when the attitudinal and behavioural measures correspond to each other regarding the featured context, action, and time.

5.2.2 Objective 2

Objective 2 - To investigate the influence of diving attitude on responsible underwater behaviour among SCUBA divers

Most studies involving behavioural theories in explaining environmental behaviour formation recognised attitude as one of the most important influences on behaviour (Newhouse, 1990). Attitude is defined as a psychological state that predisposes a person to act favourably or unfavourably to an event or situation (Eagly & Chaiken, 1993, p. 1). Several theorists (Ajzen & Fishbein, 1973; Cottrell & Graefe, 1997; Heberlein & Black, 1976) have indicated that more specific-issue variables are better predictors of overt behaviour in specific-issue situations. Cottrell and Graefe's (1997) study on specific responsible environmental behaviour among recreation boaters, illustrates that attitude measures specific to a given behaviour are better predictors of that behaviour compared to more general measures. In relation to this, the present study uses diving attitude to represent specific attitude and examined its influence on specific issue related behaviour, i.e. divers' underwater behaviour.

As mentioned earlier, the relationship of specific attitude-behaviour would be examined using diving attitude as specific attitude, while underwater responsible behaviour represents specific behaviour. The underlying premise of the hypothesis is that the more positive the level of diving attitude, the more likely the divers will exhibit positive underwater diving behaviour. The result for the hypothesis is discussed as follows.

H2: Diving attitude has a significant relationship with underwater behaviour of divers

The significant coefficient value of .217 indicated that diving attitude has a reasonably strong positive relationship with divers' underwater responsible behaviour. The result

revealed that diving attitude, which was represented by knowledge of diving practice, knowledge of diving regulations, and personal commitment, has a relatively strong influence on the divers' underwater behaviour. This implies that as diving attitude improves, the more positive is the diver's underwater behaviour. Comparatively, personal commitment (r=.86) possesses the highest influence on divers' underwater behaviour, followed by knowledge of diving regulations (r=.79) and knowledge of diving practice (r=.72). The result revealed that the conative/behavioural component of diving attitude is more influential than the cognitive aspects of diving attitude. This would mean that 'doing it' is better than just 'knowing it'.

The strong relationship between diving attitude and responsible underwater behaviour supports Heberlein and Black's (1976) proposition that attitude measures specific to a given behaviour are better predictors than that of more general behaviours. In the current study, the three dimensions of diving attitude have successfully contributed to the explanation of responsible underwater behaviour. The significant influence is understandable, in that the knowledge of dive practice and the knowledge of diving regulation are pre-requisite to positive safety diving behaviour such as underwater positioning, regular inspection of depth and regulator monitor and good finning technique. Through diver certification process, divers are equipped with such knowledge which subsequently also influences non-contact diving and skill diving behaviour. The relationship of specific attitude and responsible behaviour is consistent with Cottrell and Graefe's (1997) study on recreation boaters. The result also confirmed Newhouse's (1990) assertion that attitude construct has been recognised as having major influences on behaviours.

5.2.3 Objective 3

Objective 3 - Diving attitude will serve as the linking variable that connects personal factors (experience level, personality, and environmental concern) to the divers' underwater behaviour

In explaining exercise behaviour, Courneya, Bobick and Schinke (1999) have observed that demographic variables and personality traits have been theorized to influence behaviour indirectly through the social-cognitive constructs (i.e. attitude, social norms and perceived control behaviour). This means that there are possibilities that the relationship between personal factors (i.e. personality, experience level and environmental concern) and divers' behaviour underwater are mediated by their diving attitude. To examine the mediating effect of diving attitude on the relationship between personal factors and divers' underwater behaviour, the results for each of the following hypothesis were discussed as follows.

H3a: Diving attitude mediates the relationship between experience level and underwater behaviour of divers

The significant coefficient value of .59 indicated that experience has a relatively strong positive relationship with diving attitude. The result indicated that experience level, which was represented by frequency of completed dives, diving certification, and self-rating level, has a reasonably strong influence on the diving attitude of divers. This means that as divers' experience level increase, the more positive is their diving attitude.

In relation to recreation specialization theory, Bryan(1977) has highlighted that as individuals increase their level of participation/specialization within their respective activity, their attitudes, values and behaviours related to the activity may simultaneously

change. This notion was further supported by Todd *et al.*'s (2000) finding concerning the positive relationship between divers' level of development and diving attitudes/management preferences. Thus, the positive relationship between experience and diving attitude found in the present study is consistent with previous observations by Todd *et al*. (2000) and Thapa *et al.* (2006). Experienced divers possess better skills and knowledge as a results of more dives completed, higher diving certification, and higher self-rating level in diving. These characteristics influence diving attitude, which consists of knowledge aspects of diving practise and regulations and behavioural commitment. Divers are exposed to techniques and knowledge concerning proper diving practices, and the marine environment during their diving certification programs. This exposure elevates positive diving attitude which subsequently influences responsible underwater behaviour.

The structural relationship analysis indicated that experience influences underwater behaviour in two ways: directly and indirectly. Of the two, the direct effect of experience on underwater behaviour is stronger than the indirect effect through SCUBA diving attitude. As stated earlier, in this study, diving experience relates to skill and knowledge. Hence, endeavours to improve the skills and knowledge of the less experienced divers need to be emphasized. It is pertinent for dive masters to give additional attention and guidance to less experienced divers while diving underwater. Furthermore, dive operators should ensure the skills among divers are appropriate for the dive sites. During briefing sessions, there should be equal emphasis put on the security and the fragility of marine environment. Even the experienced divers are not to be neglected or exempted from dive briefing. As different dive sites would possess different marine environment such as topography and current conditions, the dive briefing sessions are vital to all divers.

H3b: Diving attitude mediates the relationship between personality and underwater behaviour of divers

With coefficient value of .196, the result indicated that personality has a positive relationship with diving attitude. This means that the five dimensions of personality traits i.e. extraversion, agreeableness, conscientiousness, neuroticism, and openness to experience can influence diving attitudes of divers. Except for neuroticism (r= -.20) showing negative relationship, all the other four dimensions are positively related to diving attitude. In other words, divers with higher extraversion, agreeableness, conscientiousness, and openness to experience traits will demonstrate more positive diving attitude. On the other hand, divers with higher neuroticism would possess less positive diving attitude.

Significant association between the Big Five personality traits and general environment attitude have been observed in numerous studies (Hirsh & Dolderman, 2007; Mayer & Frantz, 2004; Swami *et al.*, 2010). Most previous environmental studies related to personality traits have mainly focused on its relationship with general environmental attitude and pro-environmental behaviour. However, several researchers have suggested that personality traits can be employed to predict more specific attitudes and value orientation (McCrae & Costa, 2008; Roccas *et al.*, 2001). In the context of SCUBA diving, there was no previous study to explore the relationship of personality and diving attitude.

In the current study, the three personality traits of agreeableness (r=.237), extraversion (r=.237), and openness to experience (r=.231) are identified as dominant characteristics of divers which influence diving attitude. Two of the identified personality traits: agreeableness and openness to experience are consistent with Hirsh and Dolderman

(2007) study, in that both traits emerged as significant predictors of pro-environmental attitude. As explained by Mayer and Frantz (2004), individuals with these traits are more empathetic and less self-focused. Thus, they are more prone to develop a personal connection with nature, which consequently predicts their pro-environmental attitudes. In this case, divers with these personality traits tend to exhibit characteristics such as active social interaction with others, receptive to new information, responsible, more incline to acknowledge and follow diving guidelines and regulation. This explains the reason for the relationship between the three personality traits and diving attitude, which comprises the components of knowledge of diving practise and regulation, as well as behavioural commitment. However the role of extraversion in influencing diving attitude is unique to this study.

Comparatively, the direct effect (ß=.12) of personality towards underwater behaviour is much stronger than the indirect effect (ß=.043) mediated through attitude. The significant direct relationship between personality and underwater behaviour may be explained by the nature of diving activity itself. While diving underwater, behaviours such as inspection of regulator reading, checking of underwater positioning, avoid touching coral reef are repeated often, and have the potential to become routine or habitual in nature. Kassin (2003) explained that personality traits are related to habitual pattern of behaviour and thoughts. As such, personality traits may capture routine or habitual aspects of behaviour that similarly influence behaviour less dependent on specific social cognitions (Ouellette & Wood, 1998), in this case diving attitude.

H3c: Diving attitude mediates the relationship between environment concern and underwater behaviour of divers

The relationship between environmental concern and diving attitude was weak and not significant ($p > .05$), represented by coefficient value of -.114. This indicated that environmental concern has a negative and weak relationship with diving attitude. It was observed that the environmental concern measurement is largely characterized by technocentric (loading = -.833) and dualcentric (loading = -.823), which are negatively represented. On the other hand, ecocentric has only medium loading of .50. Thus, this explains the negative relationship that occurs in the relationship between environmental concern and diving attitude. This means that as divers are more technocentric or dualcentric, they are less likely to show responsible underwater behaviour.

Since environmental concern has a weak and non significant relationship with both diving attitude and underwater behaviour ($\beta=.062$, $p>.05$), it fails to be a prominent factor in influencing divers' underwater behaviour, directly or indirectly. Diving attitude also did not play a mediator role in the relationship as well.

The finding supports the Ajzen and Fishbein (1980) proposition that general attitudes (environmental concern) do not have a direct causal impact on specific behaviours (underwater behaviour). This study discovers that specific SCUBA diving attitude possesses significant influence ($\beta=.217$, $p<.05$) on underwater behaviour. The relatively much stronger influence of specific SCUBA diving attitude on divers' underwater behaviour compared to general environmental concern, is consistent with other environmental behaviour studies conducted by Heberlein and Black (1976), Azjen and Fishbein (1980) and Hines *et al.* (1987).

5.2.4 Objective 4

Objective 4 - To examine the influence of subjective norms on SCUBA divers underwater responsible behaviour

According to Norm-Activation Theory (Schwartz, 1973), there are two main factors which influence altruistic behaviour, i.e. personal norms and social (subjective) norms. This theory is explained based on the basic premise that personal moral norms are a direct determinant of altruistic behaviour. Personal norms refer to an individual's conviction or belief that acting in a certain way is right or wrong. It is primarily internalised. Subjective norms represent values and standards somewhat dictated by specific referents (family members, friends, neighbours, or social groups) in terms of how we should behave (Oom Do Valle *et al.*, 2005). Nevertheless, the influence of subjective norms on individual behaviour is not direct. It is mediated by personal norms of altruistic behaviour. Though some empirical evidence has shown that personal norms contribute to the explanation of pro-environmental behaviours such as, recycling (Guagnano *et al.*, 1995), general environmentalism behaviour (Gärling *et al.*, 2003; Wiidegren, 1998), and green consumerism (Thøgersen & Ölander, 2006), the mediating effect of personal norms on the relationship between subjective norms and underwater behaviour is yet to be investigated. In order to further examine the mentioned relationships, the current objective was proposed.

As mentioned in the NAT (Schwartz, 1973), another factor which influences altruistic behaviour is social/subjective norms. Subjective norms represent a person's perception of social pressure surrounding him/her. Oom Do Valle *et al.* (2005) stated that social norms represent values and standards somewhat dictated by specific referents (family members, friends, neighbours, or social groups) in terms of how we should behave. In

other words, subjective norms refer to an individual's beliefs about whether their society's members (family, friends, and co-workers) believe that the individual should or should not engage in a specific behaviour. In the context of SCUBA diving, the society members include diving buddies, dive masters/instructors, and diving friends.

H4: Subjective norms have a significant relationship with divers' underwater behaviour

With a coefficient value of .054, the result showed that the relationship between subjective norms and divers' underwater behaviour was very weak. The influence of subjective norms on the divers' underwater behaviour was not significant ($p > .05$). This findings supports NAT that subjective norms does not have a direct influence on pro-environmental behaviour (Schwartz, 1977). Schwartz regards social norms as reflecting the perceived expectations of significant reference others (e.g. family members, friends or co-workers). The behavioural impact of social norms is considered to be based on social pressure that is the fear of social sanctions. In the case of SCUBA diving activity, divers' underwater behaviour does not seems to be directly influenced by subjective norms derived from significant others (i.e diving buddies, dive instructors or other diving friends), in the form of fear of social sanctions.

This weak influence of subjective norms would possibly be due to the number of 'significant referents' (i.e. diving buddies, dive masters, and family members) that are present or involved while a diver is diving underwater. Recreational diving is conducted in isolated marine environment, which involved a small group of six to ten divers. Thus, the indistinct fear of social sanction (from a small group of people) would explain the weak relationship between subjective norms and divers' underwater behaviour. Another cause to consider would be 'how frequent do the 'significant referents' dives with each

other?'. It is common for divers to visit different dive sites and dive with different new partners or dive masters. In such cases, the perceived social pressure that is the expectations of significant reference persons to perform or not to perform certain behaviour would be minimal. Hence, this explains the weak correlation between subjective norms and divers' underwater behaviour. Furthermore, it was identified that adventure social groups (subjective norms) influence an individual mainly in the aspects of safety, risk management, and sharing of experience (Dimmock, 2009; Stebbins, 2002; Stokowski, 1994). Apparently, the subjective norms do not have considerable influence on the pro-environmental behaviour of divers. Hence, this explains the non significant relationship of subjective norms with underwater responsible behaviour.

5.2.5 Objective 5

Objective 5: To examine the influence of personal norms on SCUBA divers underwater responsible behaviour

As described by Schwartz (Schwartz, 1973) in the Norm-Activation Theory (NAT), personal norms are a direct determinant of altruistic behaviour. Primarily, activation of personal norms is influenced by awareness of behaviour's consequences and ascription of responsibility. Much empirical evidence indicates that personal norms contribute to the explanation of a variety of pro-environmental behaviours, such as littering (Heberlein, 1972), yard burning (Van Liere & Dunlap, 1981), energy used (Black *et al.*, 1985), environmental hazard (Stern *et al.*, 1985), recycling (Guagnano *et al.*, 1995), general environmentalism behaviour (Gärling *et al.*, 2003; Wiidegren, 1998), and green consumerism (Thøgersen & Ölander, 2006). However, there is a lack of study that examines the influence of personal norms on the pro-environmental behaviour among

recreationist, specifically in SCUBA diving activity. Based on previous literature, the present study proposed that personal norms can influence underwater responsible behaviour among divers.

In order to examine the influence of personal norms on divers' underwater behaviour, the following hypothesis is forwarded to be tested.

H5: Personal norms have a significant relationship with underwater behaviour of divers

The significant coefficient value of .109 indicated that personal norms have a positive relationship with divers' underwater responsible behaviour. The finding indicated that personal norms, which comprise ascription of responsibility and awareness of behaviour's consequences do influence on divers' underwater behaviour. This means that as personal norms develop, divers tends to portray more positive underwater behaviour.

The significant relationship between personal norms and responsible underwater behaviour provides empirical support for the role of personal norms as a determinant of pro-environmental behaviour, as suggested in Norm-Activation Theory (Schwartz, 1973). This finding is also consistent with previous works conducted in other pro-environmental behaviour studies such as yard burning (Van Liere & Dunlap, 1981), energy used (Black *et al.*, 1985), environmental hazard (Stern *et al.*, 1985), recycling (Guagnano *et al.*, 1995), general environmentalism behaviour (Gärling *et al.*, 2003); (Widegren, 1998), and green consumerism (Thøgersen & Ölander, 2006). Personal norms refer to an individual's conviction that acting in a certain way is right or wrong, and it is internalized. However, SCUBA diving is an appreciative activity whereby individual's involvement is to enjoy the natural environment without intention in

altering its natural state (Dunlap & Heffernan, 1975). Studies have indicated that the primary motivation for recreation divers to engage in marine conservation programs was a desire to contribute to environmental conservation (Goffredo *et al.*, 2010); (Hammerton *et al.*, 2012). The indication is that there is a feeling of strong moral obligation (personal norms) among divers to engage in certain altruistic behaviour to preserve the marine environment. Thus, it is logical that there is a significant relationship between personal norms and responsible underwater behaviour.

5.2.6 Objective 6

Objective 6: To examine the mediating role of personal norms in the relationship between subjective norms and SCUBA divers underwater responsible behaviour

As discussed earlier, Schwatz's Norm-Activation Theory advocates that the influence of subjective norms on individual behaviour is not direct. It is mediated by personal norms of altruistic behaviour. Hence, the study formulated the next objective to examine the mediating effect of personal norms in the relationship between subjective norms and divers' underwater behaviour.

H6: Personal norms mediate the relationship between subjective norms and underwater behaviour of divers

The reasonably strong relationship between subjective norms and personal norms was represented by a significant coefficient value of .344. The result showed that subjective norms are positively related to personal norms. This implies that as divers' subjective norms develop, so do their personal norms.

This finding is consistent with the results of various pro-environmental studies (e.g. (Hunecke *et al.*, 2001; Hungerford & Volk, 1998; Kallgren *et al.*, 2000); (Bratt, 1999). As explained by Kallgren *et al.*(2000) the influence of social norms in the formation of personal norms seems to be based on easily accessible sources of information. Often our personal understanding is influenced by dialogue with other people who interpret and frame rules within a personal context. The internalization of personal norms is a social construction process in which a shared meaning of a situation is created (Vygotsky, 1981). Therefore, specific referents within the diving community and environment positively influence divers' personal norms. It also means that practices such as pre-dive briefings by dive masters and discussion sessions among diving communities are useful in promoting personal norms of divers towards environmental and safety diving behaviour.

The mediator effect of personal norms on the relationship between subjective norms and responsible underwater behaviour was assessed using the three steps recommended by Baron and Kenny (1986). The first condition is significant in that personal norms are directly related to subjective norms ($\beta = .344$). The second step is significant, as personal norms have significant effect on responsible underwater behaviour ($\beta = .109$). The final step examines the relationship between subjective norms and underwater behaviour. It was revealed that subjective norms do not possess significant relationship with underwater behaviour ($\beta = .054$, $p > .05$). Thus, personal norms have a full mediation effect in the relationship of subjective norms and underwater behaviour. This finding supports the NAT (Schwartz, 1977), which asserted that the influence of social norms on individual behaviour is not direct. However, it is mediated by personal norms of altruistic behaviour.

The result indicated that internalization feature of personal norms (Schwartz, 1977) plays an important role in influencing underwater behaviour. As mentioned before, information and education gained through social interaction between divers and significant referents promotes underwater responsible diving behaviours. Besides education, personal involvement/experience in marine conservation together with the diving community could provide better understanding and interpretation of marine conservation among divers. This could help cultivate positive personal norms among them. Several scholars have indicated that exposure to real life experience in nature helps develop emotional affinity and protective behaviour towards nature (Millar & Millar, 1996; Pooley, 2000). Among these experiences are volunteering in marine conservation programs such as underwater garbage collection, Crown of thorns cleaning, and reef checking surveys, among others. All these activities enhance divers' personal norms towards marine environment and influence their underwater responsible behaviours.

In conclusion, the results of the present study offered support to consider the suggested variables of experience, personality, personal norms, subjective norms and diving attitude as antecedents that affect responsible underwater behaviour among divers. All these constructs have significant positive effects on responsible underwater behaviour. It was interesting to note that these variables accounted for 52% of the variance in understanding underwater behaviour. However, the three personal constructs of experience, environmental concern and personality were found to explain 45% of the uncertainties in the diving attitude construct.

5.3 Implication of research

This study has several distinct contributions to knowledge. Firstly it provides validated exploratory dimensions which constitute the measurement constructs for responsible underwater behaviour as well as SCUBA diving attitudes. Attitude has never been examined by previous researchers in relation to SCUBA divers. Secondly this study is testing the role of specific SCUBA diving attitude in the relationship between environmental concern and responsible behaviour underwater. The study also contributes to the body of knowledge with respect to the relationships between individual dimensions of SCUBA diving attitude with the individual dimensions of responsible underwater behaviour.

The main theoretical contribution to knowledge of this study is the exploration of SCUBA diving attitude vis-à-vis divers' underwater responsible behaviour. The study shows that divers possess the highest attitude of cognitive domain (knowledge of diving practice, and knowledge of regulations), followed by a relatively lower conative domain (commitment). The two domains play crucial roles in the formation of positive diving attitude. The importance of cognitive domain supports many previous researchers proposition that knowledge has a positive influence on attitude, which in turn affects behaviour (Cottrell & Graefe, 1997; Hungerford & Volk, 1990; Newhouse, 1990; Sia *et al.*, 1986). The significant relationship of cognitive dimension and conative dimension of diving attitude on diver's underwater behaviour highlights the important role of diving and marine education related to the development of skills and creation of environmental awareness among divers. Therefore, it is vital that the diving industry emphasizes both knowledge acquisition and skill development and improving technical competency of divers during certification and beyond. To instil positive diving attitude,

it is essential to educate divers using a well-planned diving curriculum on personal safety and responsibility, and the conservation of aquatic resources.

From the research findings, cognitive and conative components are essential in the development of diving attitude. Thus, well-constructed education and interpretation programs need to be formulated based on effective learning models. Environmental/conservation education program should not only focus on divers' knowledge acquisition but also provide them with opportunities to act on what they are learning (Belknap, 2008). Low Impact Diving practices should be promoted by dive operators and incorporated in diving sessions with divers. In addition, engaging divers to volunteer in marine monitoring program would be another avenue for the divers to practice their skills in an environmentally responsible way.

Other than contents of the diving and training curriculum, stakeholders in the diving industry should not overlook the importance of how diving and conservation knowledge is disseminated. In a recent study by Camp & Fraser (2012), it was found that there is no difference in the frequency of interaction with the reef, among divers who had participated in environmental conservation courses such as PADI, AWARE or REEF or not. On the other hand, the level of conservation education disseminated during dive briefings did influence diver behaviour in terms of reducing the frequency of divers' interactions with the reef. It is suggested that a detail guide of environmental content is recommended for dive masters to be used in dive briefings.

Since Malaysian dive sites are frequent by majority of foreign divers, local operators have to aware that a diver's locational history may influence their knowledge and understanding about marine life and reef in Malaysia. For example, a diver from

Norway used to diving in temperate cold water or quarries may not be aware of the biological life in the tropical Malaysian reefs. Hence, further attention and briefing, which contains local biological information, is necessary to enhance the diver's knowledge and good diving practices.

5.4 Contributions of Research

The current study revealed the following contributions:

5.4.1 Theoretical contribution

In conclusion, this study has succeeded in providing a strong support for the use of coherent theory (Stern, 2000) in examining pro-environmental behaviour among divers. The current study introduced an integrated framework, with the combination of variables from TRA and NAT, which contributed towards better understanding of underwater responsible behaviour among divers. Internal personal factors such as diving attitude, subjective norms, and personal norms were found to be pertinent factors in influencing divers' underwater behaviour. The findings support the notion that pro-environmental behaviour is best viewed as a mixture of self-interest and social motives. The reasonable level of explanatory power (R^2=.26) achieved by the variables confirmed the applicability of the coherent theory in explaining environmental behaviour among outdoor recreationists. It is suggested that future outdoor recreation studies should not be confined and be more liberal in using the concept of coherent theory, in the examination of pro-environmental behaviour among recreationists.

The present study empirically explored various self-reported behaviours and identified three distinct behavioural (safety diving behaviour, buoyancy control diving behaviour,

and non-contact diving behaviour) dimensions among divers. These dimensions provided us better insights of the various aspect of responsible SCUBA diving behaviour. Comparatively, Musa *et al.* (2011) only managed to represent divers' behaviour with a single dimension. Thapa *et al.* (2006) identified divers' behaviour with three weakly differentiated dimensions, which were contact diving behaviour, general diving behaviours and general educational behaviours. However, Thapa *et al.*'s (2006) combination of dimensions only explained 49% of the variance. In the present study, the three clearly differentiated measures of SCUBA diving behaviour dimensions: safety diving behaviour (.99), buoyancy control diving behaviour (.82) and non-contact diving behaviour (.52), explained 60.00% of the variance. Another important SCUBA diving behaviour dimension discovered in this study was buoyancy control behaviour, which has not been looked into by both Thapa *et al.* (2006) and Musa *et al.* (2011). This behaviour is important to be examined as it affects both the safety of divers as well as the marine environment. Thus, future measurement of SCUBA diving behaviour could usefully adopt these dimensions, as the instrument has higher reliability and validity.

The main theoretical contribution of this study is the exploration of the dimensions of SCUBA diving attitude. This study confirmed the existence of three core components of specific SCUBA diving attitudes. These are cognitive (the knowledge of diving practice and the knowledge of regulations), conative/behavior (commitment), and affective (awareness of consequences) components, all of which are related to explaining diver's underwater behaviour. However, the affective component was not included in the final measurement model of diving attitude due to low factor loading. With regards to this, the result may reflect that divers are less aware of the consequences of their actions on the reef. A study in Thailand has indicated that divers practice a low level of environmental care (Worachananant *et al.*, 2008). Thus, there is great possibility that divers were simply unaware that their actions can injure coral. Another study on wreck

divers (Edney, 2012) also revealed that some divers participate in activities which disturb sites and they may not be aware of the consequences of disturbing and moving artefacts around. It seems that among divers, there is little awareness or understanding of the ways in which divers might be a problem to the reef. The low level of awareness of the consequences may have resulted the affective domains (aware of consequences) to be poorly correlated to diving attitude, and being discarded from the construct. However, this assumption needs further attention in future studies.

The study indicated that diving attitude is well measured by the conative/behavioural dimension (factor loading=.87) and cognitive dimension (knowledge of regulations, factor loading=.81; knowledge of diving practice, factor loading =.72). The present finding has shed new light on the importance of conative dimension in the formation of diving attitude, specifically for SCUBA diving activity. Conative dimension is associated to divers' willingness to contribute financially, to commit time and keep track with current marine conservation issues. Thus, promotion of volunteering in marine monitoring program or scientific diving studies is a feasible way to instil and cultivate positive diving attitude among divers. Such programs would also fulfil diver's motivations in diving which include 'experiencing underwater flora and fauna', 'exploring new things', and 'learning about the underwater environment' (Meyer *et al.*, 2003; Dearden *et al.*, 2006; Musa *et al.*, 2006).

Reviewing previous literature, many researchers have placed much emphasis on the importance of both cognition and affect to understanding environmental attitudes, particularly in environmental education program (Eagly & Chaiken, 1993; Esses *et al.*, 1993; Millar & Millar, 1996). As environmental education is to change behaviour, Pooley and O'Connor,(2000) have suggested that it would be beneficial first to

understand the basis of environmental attitudes in facilitating the changing of environmental behaviour. As environmental programs were mostly cognitively based, additionally there is a necessity and advantage in looking at the conative dimension, especially for the development of diving attitude. Hence, it is important that conative and cognition dimensions are taken into account when working to change diving attitudes and divers' underwater responsible behaviour. This serves as a reminder that more complex considerations may be needed to support an environmental education program for divers in the promotion of underwater responsible behaviour. For example, environmental/conservation education program developed based on Orams model (1995) would be a good choice, because it incorporates both the cognitive and affective domains as well as provide participants with opportunities to act (conative component). Environmental/conservation education program should engage the divers' curiosity in learning (cognitive) and feelings towards the environment (emotions), and provide them with opportunities to act on what they are learning (Belknap, 2008). This could promote better interpretation of marine conservation among divers, and enhance their diving attitude, which in turn influences divers to behave in a more environmentally responsible way.

5.4.2 Methodological contribution

Previous research concerning underwater behaviour of SCUBA diving has been commonly studied and analyzed using ANOVA and regression analysis (Musa *et al.*, 2011; Thapa *et al.*, 2006). Using SEM, the present study has attempted and successfully presented a divers' underwater behaviour model, which involved related personal factors (experience level, personality, environmental concern and diving attitude) and normative factors (personal norms, subjective norms). These related factors have successfully explained 52% of the variance in divers' underwater responsible behaviour,

compared to 38.3% in Musa's (2011) study. The empirical results of this study provided plausible evidence that the proposed structural equation model designed to consider experience, personality, diving attitude, personal norms and subjective norms to explain divers' responsible underwater behaviour is sound. Therefore, this study has a substantial capability in confirming the role of all the selected social-psychological variables in the research model as influencing responsible underwater behaviour. Furthermore, the model can be employed as a study framework for future research in environmental behaviour among marine related participants and authorities. Future studies incorporating other SCUBA diving model such as Dimmock's (2009) in-water comfort, constraint and negotiating (CNN) model would further enhance the understanding of divers' underwater responsible behaviour.

Additionally, the methodology used in the analysis (SEM) has enabled the present study to develop validated exploratory dimensions which constitute the measurement constructs for responsible underwater behaviour as well as SCUBA diving attitudes. This validated measurement may be utilized for further research examining environmental behaviours in the marine environment.

5.4.3 Managerial contribution

The findings of the study revealed that the experience construct, which is related to skill and knowledge, has the most influence on the prediction of underwater behaviour among divers. Hence, endeavours to improve the skills and knowledge of the less experienced divers need to be emphasized. It is important for dive masters to give additional attention and guidance to less experienced divers when diving underwater. Furthermore, dive masters and instructors should ensure the skills among divers, those less experienced and even the experienced ones are appropriate for the dive sites. As

experience level can be easily and readily gauged through 'numbers of dives made' ('dive logbook') and 'diving certification', it could be used as a benchmark or guideline to manage divers' visitation to 'fragile' islands such as Sipadan Island in Malaysia. With reference to previous study by Worachananant *et al.* (2008), their study indicated that novice divers (with 50 or less logged dives) came into contact with corals much higher than more experienced divers. Thus, Sipadan Island authority may consider imposing 50 logged dives as the minimum requirement for eligibility to visit the island, because divers are likely to face strong currents and different underwater topography which require divers to have sufficient skills and experience.

Based on the current findings, the concept of diving attitude can be explained as follows: for an individual to act responsibly towards an object or situation, certain information or knowledge about the object needs to be acquired. For example, a diver needs to know the marine environment, and the skills needed to perform the activity in a safe and proper manner so as not to endanger oneself or harm the aquatic life and environment. On top of that, divers need to possess knowledge of marine parks regulations in order to mitigate destructive impacts on the marine environment. In addition, past occasions or experience in which the diver has been involved in marine conservation activity (conative/behavioural dimension) is of substantial importance in influencing diving attitude. Thus, the previous experience or involvement of divers in marine conservation activities could be taken into consideration by authorities or governing bodies, as pre-requisite for divers to engage in diving activity in 'fragile' dive sites.

It is noteworthy that cognitive (knowledge of diving practice and knowledge of regulations) and conative/behavioural (commitment) dimension of diving attitude contributed to the explanation of divers' underwater responsible behaviour. Realizing

the importance of the cognitive dimension of diving attitude, it is imperative that the diving industry emphasize the technical competence and skill development of divers during the certification process. Beyond this, development of skill and technical competency should not only relate to safety, but also linked to the responsibility of protection and conservation of aquatic environment. Thus, additional marine ecosystem education should be incorporated in the curriculum of the diver certification program. Inclusion of the element on marine conservation would further extend the knowledge of diving practice, which eventually leads to divers' realization and actualization of underwater responsible behavior.

The conative domain is related to behavioural commitment towards responsible behaviour. A study on the effect of a conservation education program on divers (Belknap, 2008) indicated that divers are more committed to preserving the coral reefs when they have acquired sufficient knowledge and understanding about the reefs. Hence, in situations where individuals feel committed to resolving impact problems, they are more likely to engage in responsible behaviour. To enhance commitment of divers, involvement of divers in conservation of aquatic resources should be encouraged. This could be achieved with the support and sponsorship of various stakeholders such as marine conservation organizations, governmental agencies and the diving industry. With substantial sponsorship from the stakeholders, divers should be offered the chance to be involved at no cost, in marine conservation activities such as underwater clean-up, reef monitoring programs and others. In line with this, integrated programmes and continuous education on marine conservation could further enhance divers' awareness of behaviour consequences and personal commitment to environmental responsibility.

In the current study, personal norms were identified as an antecedent that influences divers' underwater responsible behaviour. Personal norms involve individual's feelings of strong moral obligation to engage in certain altruistic behaviour. Education and personal involvement/experience (in marine conservation) could provide better understanding and interpretation of marine conservation among divers. This could help cultivate positive personal norms among them. As reported by Dearden *et al.* (2007), divers who witnessed negative impacts of diving activity, such as anchor damage, garbage disposal and divers' impact on coral reef, were significantly more likely to indicate interest to participate in reef conservation project. Recognising that direct experience is often the most powerful teacher (Manfredo & Bright, 1991; Orams, 1995), informal education through direct experience as mentioned above, should be encouraged and guided by dive instructors. On top of that, campaigns relating to volunteering in marine conservation programs such as underwater garbage and Crown of Thorns cleaning, reef checking surveys, among others should be widely promoted and provide participation opportunities among divers. These activities help develop emotional affinity and protective behaviour towards nature (Millar & Millar, 1996; Pooley, 2000). Hence, could enhance divers' personal norms towards marine environment and influence their underwater responsible behaviours.

The current study shows that subjective norms are indirectly related to underwater responsible behaviour of divers via the relationship with personal norms. This association indicates that certain individuals (i.e. diving buddies/partners, dive masters / instructors, other diving friends and family members) have positive influences on personal norms of divers which then lead to responsible underwater behaviour. The findings reveals that dive masters/instructors have the greatest influence on divers' responsible behaviour while diving underwater. It is then followed by influence of

diving buddies/partners and other diving friends. The significant role of dive instructors in influencing diver's personal norms and diving behaviour should be emphasized. Studies have shown that pre-dive briefings by dive instructors can play a significant role in reducing diver damage on reef (Davis & Tisdell, 1996; Medio *et al.*, 1997; Rouphael & Inglis, 1997). Thus, on-going training programs for dive instructors to continuously upgrade their diving skills and knowledge on marine environmental conservation ought to be provided. Such program could improve the effectiveness with which environmental dive briefings are given to all dive groups. The functional roles of diving buddies and friends can be reflected in activities such as marine conservation discussion sessions among diving communities, which are helpful in promoting divers' responsible diving behaviour. In this regards, the role of buddy should be extended beyond the concern of safety and expanded to the responsibility of safeguarding the marine environment.

In the current study, the personality traits of openness to experience, extroversion and agreeableness are identified as characteristics of divers which influence responsible underwater behaviour. Divers with these personality traits tend to exhibit characteristics such as active social interaction with others, receptive to new information, responsible, more inclined to acknowledge and follow diving guidelines and regulations. With these common characteristics among divers, it would seem encouraging for the regulatory body of dive sites to introduce both direct and indirect management strategies to enhance reef protection programs. Examples of indirect strategies would include better education of both instructors and guides, as well as the divers themselves. This would relate to the inclusion of visitor interpretation strategies. Well-structured and informative interpretation programme could educate and encourage divers to practise more appropriate responsible behaviours, on-site and elsewhere. Besides, it can improve

divers' overall understanding of the marine environment and enhances their diving experiences, which in turn could assist in the protection and conservation of marine environment (Moscardo & Pearce, 1986); (Walker & Moscardo, 2006); (Weiler & Ham, 2001) . Direct management strategies would include suggestions like zoning, restricting the number of dives per year, formal enforcement of regulations, the use of permits and user-pay strategies among others. It is suggested that certification renewal program should be imposed on inactive divers who have lapsed from diving activity for more than 5 years.

However, dive operators should be aware of and give attention to divers with neuroticism who appear nervous, insecure and worried characteristic, that are likely to display depreciative underwater behaviour. This group of divers may require closer supervision from dive leaders while diving underwater. They can also be paired with buddies having personality traits of extroversion, openness to experience, and agreeableness. Active intervention might be needed to avoid the unnecessary detrimental impact caused by the divers onto the marine environment.

5.4.4 Marketing contribution

Recognizing the importance of the cognitive dimension of diving attitude, it is vital that the diving industry emphasize the approaches of promoting responsible underwater behaviour among divers. The informal approach of knowledge dissemination through briefing session (before and after) of each dive, conducted by dive instructors, has been emphasized by numerous researchers (Hawkins & Roberts, 1997; Rouphael & Inglis, 1997; Schleyer & Tomalin, 2000). However, the content of the session should extend beyond rules and regulations, and safety procedures. Additionally, it should provide information about dive sites, particular features of the aquatic environment, diving

conditions and the necessary diving skills and etiquette needed. Hence, this would offer an opportunity for the divers to apply the knowledge of diving practice in developing skill diving behaviour through a real-life experience. In due course, this would enhance divers' responsible underwater behaviour.

To enhance the promotion of responsible diving behaviour, marine conservation education programs can be integrated and promoted as a value-added product along with diving packages. As reported in Belknep's (2008) study, divers were highly receptive of the environmental education programme and many divers stated they were more committed to preserving the coral reefs after the programme. This indicated that their attitude or value orientation was affected by what they had learned. Among the topics recommended to divers are: information about the history of the reefs, details of the ecosystem, specific impacts the reefs are experiencing, typical fish found in the area. Taking into consideration the different levels of experience among divers, it is recommended to prepare multi varied programs so that any topic can be covered at different levels of detail.

Incorporating to the education and training programs, the concept of Low Impact Diving (LID) should be widely promoted to divers by stakeholders in the diving industry. LID refers to having minimal contact to a site while diving (SaveOntarionShipwrecks, 2008). LID advocates diving practices such as: be neutrally buoyant throughout the dives, look but don't touch, use appropriate finning technique, secure loose diving equipment, remain well above the bottom (2 meters distance) and maintain a horizontal swimming profile. With education and dive trainings emphasized on Low Impact Diving, it would surely enhance the practice of responsible diving behaviour among divers.

Considering the pertinent role of personal norms and the cognitive dimension of 'knowledge of regulations', the approach in conveying the message concerning the penalties, boundaries and prohibited activities in marine park areas should be conveyed in a more direct and positive way. The common approach of using posters to inform users about what not to do may not be effective in influencing divers' underwater behaviours. This form of information/ knowledge may have been interpreted by divers as means of external control being enforced by the authorities in order to mitigate divers' negative impacts on the aquatic environment. This kind of information/knowledge seems to be a neutral or negative enforcer and does not promote the sense of personal responsibility towards the marine environment. In order to improve the effectiveness of the information on regulations, the approach in the presentation of information may need to be revised. Rather than emphasizing on what divers should not do, perhaps it will be more effective to communicate the reasons for not so doing and convey the message positively by emphasising what they should do.

In this context, messages need to be designed in such a way as to provide information/practical and technical advice on how to practise 'eco-friendly' dives rather than just warning divers not to damage the reef. This specifically informative approach and re-direction in communicating the message would most likely stimulate the personal norms more and steer them towards more responsible diving behaviour. This reorientation of the communication mode would probably be more effective in instilling pro-environmental behaviour amongst divers.

5.5 Limitations and Direction for Future Research

This study has its limitations. Firstly, some of the social-psychological and external constructs that have been reported to have effects on environmental behaviour were not

examined. These constructs include, socio-demographics, normative behaviour, locus of control, and situational conditions. It is suggested that future research should consider additional explanatory variables to build upon this study's explanation of underwater responsible behaviour among divers. Secondly, the present study has excluded behavioural intention in the combination theory, due to the difficulty in its measurement. The inclusion of behavioural intention might provide a better representation of TRA. Thirdly, this study has used self-reporting technique in measuring responsible underwater behaviour instead of observation. However, even though observed and self-reporting behaviours are not synonymous, Gamba and Oskamp (1994) have shown that the relationship is significant. Nonetheless, the possibility of the social desirability bias effect on the findings is difficult to be controlled. The tropical marine environment in Malaysia has limited the current study to be representative of limited types of diving activities (i.e. reef, wreck and cave diving). However, the results of the present study could be a basis for future research to be expanded to other diving environments in other regions of the world.

For future research, it is suggested that this research be continued using other marine-based recreation group (e.g., snorkelers) to see if the results found in this study exist with other similar recreation groups. It is pertinent to focus on the snorkelers as the snorkelling behaviour of this marine-based recreational group also has the potential to cause detrimental impact to the reefs.

The current study attempts to introduce an integrated framework that is able to contribute towards better understanding of responsible underwater behaviour. As the four related independent variables are significantly associated with responsible underwater behaviour, future research devoted to the promotion of responsible

underwater behaviour should delve more deeply into exploring how to influence diving attitude, and personal norms of divers.

5.6 Conclusion

A primary conclusion of this research is that the Theory of Reasoned Action (TRA) is a suitable starting point to examine underwater responsible behaviour. The findings also support Schwartz's Norm Activation Theory (NAT) model that the influence of social norms on individual behaviour is not direct, but is mediated by personal norms. However, the findings reveal the importance of experience level, diving attitude, personality, and personal norms in explaining responsible underwater behaviour. The findings support the notion that pro-environmental behaviour is best viewed as a mixture of self-interest and social motives.

This study contributes to the body of knowledge as it provides validated exploratory dimensions which constitute the measurement constructs for responsible underwater behaviour as well as SCUBA diving attitudes. The identification of relevant issues which are related to behaviour of divers underwater together with the strength of the influences allows all SCUBA diving industry's stakeholders to plan, design, and implement appropriate measures to mitigate the impacts of the activity to the marine environment.

Finally, this study has been successful in proving the existence of causal relationship between experience, personality and attitude, subjective norms and personal norms of divers with their underwater behaviour using structural equation modelling. The strong influence of both experience and diving attitude on diver's underwater behaviour emphasizes the importance of diving and marine education related to the development

of skills and knowledge of responsible diving practices among divers. Success in moulding the behaviour of divers underwater requires a collective effort of various stakeholders which include divers, dive operators, diving associations, marine conservation organizations and governmental agencies, among others.

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APPENDIX A

LISTS OF DIVE CENTRES

Peninsula Malaysia (23)

Pulau Langkawi (2)
Langkawi Coral
East Marine Holidays

Pulau Tioman (8)
Tioman Dive Centre
Tioman Reef Divers
Fisherman Divers Sdn Bhd
Bali Hai Divers
B &J Diving Centre
Salang Scuba
Ray's Dive Adventure
Eco-Divers

Pulau Perhentian (10)
Seahorse Dive Centre
Watercolours Dive Centre
Quiver Dive Team
Turtle Bay Divers
Sunlight Divers
Steffen Sea Sports
Spice Divers
Senja Bay Resort
Seadragon Divers
Stingray Divers

Pulau Redang (3)
Coral Redang Island Resort
Laguna Dive Center
Redang Aquatic Adventure

East Malaysia (6)

Sipadan/Mabul (6)
Borneo Divers Mabul Resort
Uncle Chang's Mabul Dive Lodge
Mabul Water Bungalows
Billabong Scuba
Sipadan Dive Centre
Scuba Junkie

APPENDIX B

QUESTIONNAIRE

UNIVERSITI MALAYA
KUALA LUMPUR

SCUBA DIVERS SURVEY 2009

Many people enjoy SCUBA diving in order to explore and learn about marine life and the underwater world. The sustainability of this activity depends largely on the behavior of SCUBA divers underwater. The research aims to understand the relationships between personality, environmental concern, diving experience and environmental behaviour among SCUBA divers.

Your are invited to participate in this survey. The information you provide will be kept strictly confidential and the results will only be analyzed in aggregate forms. No individual identity will be revealed.

The estimated time required to complete this survey is 12 – 15 minutes.

Your kind cooperation in answering the questionnaire is very much appreciated. Thank you.

Ong Tah Fatt
Faculty of Business & Accountancy
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KUALA LUMPUR
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H/p : 017-66869049

SECTION A: DEMOGRAPHIC

Please (√) at the appropriate box:

1. Gender

   ☐ Male ☐ Female

2. Nationality: _____

3. Marital Status:

   ☐ Single ☐ Married ☐ others

4. Age (years): _____

5. Education Level :

   ☐ secondary & below ☐ diploma ☐ graduate

   ☐ post-graduate ☐ Others (please specify) : _____

SECTION B

1. To date, how many dives have you made?

   ☐ Less than 50 ☐ 51 to 100 ☐ 101 to 150

   ☐ 151 to 200 ☐ 201 and above

2. What is your level of SCUBA diving certification?

   ☐ Open water ☐ Advanced ☐ Rescue diver

   ☐ Dive Master ☐ Instructor

3. How would you rate yourself as a SCUBA diver?

   ☐ Beginner ☐ Novice ☐ Intermediate

   ☐ Advance ☐ Expert

SECTION C

Please indicate the accuracy of each statement in describing you, by **circling a number** between **'1' (Very Inaccurate)** and **'5' (Very Accurate)**.

No.	Statement	Very Inaccurate				Very Accurate
1	I make friends easily	**1**	**2**	**3**	**4**	**5**
2	I rarely get irritated	**1**	**2**	**3**	**4**	**5**
3	I respect others	**1**	**2**	**3**	**4**	**5**
4	I feel comfortable with myself	**1**	**2**	**3**	**4**	**5**
5	I have a vivid/strong imagination	**1**	**2**	**3**	**4**	**5**
6	I carry the conversation to a higher level	**1**	**2**	**3**	**4**	**5**
7	I have a good word for everyone	**1**	**2**	**3**	**4**	**5**
8	I am always prepared	**1**	**2**	**3**	**4**	**5**
9	I accept people as they are	**1**	**2**	**3**	**4**	**5**
10	I know how to captivate people	**1**	**2**	**3**	**4**	**5**
11	I believe that others have good intentions	**1**	**2**	**3**	**4**	**5**
12	I enjoy hearing new ideas	**1**	**2**	**3**	**4**	**5**
13	I seldom feel blue	**1**	**2**	**3**	**4**	**5**
14	I am not easily bothered by things	**1**	**2**	**3**	**4**	**5**
15	I believe in the importance of art	**1**	**2**	**3**	**4**	**5**
16	I am skilled in handling social situations	**1**	**2**	**3**	**4**	**5**
17	I feel comfortable around people	**1**	**2**	**3**	**4**	**5**
18	I get chores done right away	**1**	**2**	**3**	**4**	**5**
19	I carry out my plans	**1**	**2**	**3**	**4**	**5**
20	I make people feel at ease	**1**	**2**	**3**	**4**	**5**
21	I am normally the life in a party	**1**	**2**	**3**	**4**	**5**
22	I make plans and stick to them	**1**	**2**	**3**	**4**	**5**
23	I tend to vote for liberal political candidates	**1**	**2**	**3**	**4**	**5**
24	I am very pleased with myself	**1**	**2**	**3**	**4**	**5**
25	I pay attention to details	**1**	**2**	**3**	**4**	**5**

SECTION D

To your awareness, either intentionally or unintentionally, how often do you experience the following situation? Please **circle the number** besides the statement according to the following scale: ***1 = Never (N); 2 = Rarely (R); 3 = Sometimes (SM); 4 = Often (O); 5 = Always (A)***

No.	As far as you aware, how often have you … underwater?	Never				Always
1*	stand or rest on coral	1	2	3	4	5
2*	feed marine life underwater	1	2	3	4	5
3	maintain a safe distance from the reef	1	2	3	4	5
4	keep neutrally buoyant at all times	1	2	3	4	5
5	stay off the bottom	1	2	3	4	5
6*	hold onto coral	1	2	3	4	5
7	streamlined all equipment underwater	1	2	3	4	5
8*	touch coral	1	2	3	4	5
9	practice good finning technique	1	2	3	4	5
10	check underwater position/orientation regularly	1	2	3	4	5
11	bring safety sausage/signaling device	1	2	3	4	5
12	Monitor diving depth	1	2	3	4	5
13	Inspect regulator reading from time to time	1	2	3	4	5
14	Make safety stop before end of dive	1	2	3	4	5

SECTION E

Please indicate the extent of your understanding about the related issues by **circling a number** between: **"1" (Not at all)** and **"5" (To a great extent).**

To what extent do you believe that you have knowledge about …	Not at All				To a Great Extent
1. pre-dive planning procedures	1	2	3	4	5
2. diving skills necessary for various types of dive	1	2	3	4	5
3. underwater safety practices	1	2	3	4	5
4. usage and handling of underwater diving equipments	1	2	3	4	5
5. prohibited activities in local Marine Parks Areas	1	2	3	4	5
6. marine conservation programs and activities	1	2	3	4	5

7. penalties for violating local marine parks regulations	**1**	**2**	**3**	**4**	**5**
8. the boundary for Malaysia Marine Parks	**1**	**2**	**3**	**4**	**5**

For each statement below, indicate how strongly you agree or disagree to the following statements by **circling a number** between **'1' (Strongly Disagree)** and **'5' (Strongly Agree)**.

Statement	**Strongly Disagree**				**Strongly Agree**
1. Feeding fish harms the ecosystem	**1**	**2**	**3**	**4**	**5**
2. Good control of fins and accessories avoid accidental contact with the reef	**1**	**2**	**3**	**4**	**5**
3. Sediments stir up by divers may kill the coral	**1**	**2**	**3**	**4**	**5**
4. Collecting shells (dead or alive) harms the coral ecosystem	**1**	**2**	**3**	**4**	**5**

Indicate the extent of your involvement in diving activity by **circling a number** between: **"1" (Not at all)** and **"5" (To a great extent).**

To what extent …	**Not at All**				**To a Great Extent**
1. have you contributed money to marine/coral conservation program	**1**	**2**	**3**	**4**	**5**
2. do you keep track with current marine conservation issues	**1**	**2**	**3**	**4**	**5**
3. do you commit time to involve in marine conservation activities	**1**	**2**	**3**	**4**	**5**

SECTION F

Please indicate the extent that the following people expect you behave responsibly towards the marine life/environment while diving, by **circling a number** between: **"1" (Not at all)** and **"5" (To a great extent).**

To what extent …	**Not at All**				**To a Great Extent**
1. diving buddies/partners	**1**	**2**	**3**	**4**	**5**
2. divemasters/instructors	**1**	**2**	**3**	**4**	**5**
3. other diving friends	**1**	**2**	**3**	**4**	**5**

SECTION G

Listed below are statements about the relationship between humans and the environment. Please indicate how strongly you agree or disagree to the following statements by **circling a number** between **'1' (Strongly Disagree)** and **'5' (Strongly Agree)**.

Statement	Strongly Disagree				Strongly Agree
1. We are approaching the limit of the number of people the earth can support	1	2	3	4	5
2. Humans have the right to modify the natural environment to suit their needs	1	2	3	4	5
3. When humans interfere with nature it often produces disastrous consequences	1	2	3	4	5
4. Human ingenuity will ensure that we do NOT make the earth unlivable	1	2	3	4	5
5. Humans are severely abusing the environment	1	2	3	4	5
6. The earth has plenty of natural resources if we just learn how to develop them	1	2	3	4	5
7. Plants and animals have as much right as humans to exist	1	2	3	4	5
8. The balance of nature is strong enough to cope with the impacts of modern industrial nations	1	2	3	4	5
9. Despite our special abilities humans are still subject to the laws of nature	1	2	3	4	5
10. The so-called "ecological crisis" facing humankind has been greatly exaggerated	1	2	3	4	5
11. The earth is like a spaceship with very limited room and resources	1	2	3	4	5
12. Humans are meant to rule over the rest of nature	1	2	3	4	5
13. The balance of nature is very delicate and easily upset	1	2	3	4	5
14. Humans will eventually learn enough about how nature works to be able to control it	1	2	3	4	5
15. If things continue on their present course, we will soon experience a major ecological disaster	1	2	3	4	5

SECTION H

For each statement below, indicate how strongly you agree or disagree to the following statements by **circling a number** between **'1' (Strongly Disagree)** and **'5' (Strongly Agree)**.

Statement	Strongly Disagree				Strongly Agree
1. I feel a strong personal obligation to conserve marine environment	1	2	3	4	5
2. I would feel guilty if I did not behave responsibly towards the marine life/environment in my dive	1	2	3	4	5
3. I am willing to spend time to participate in marine conservation activities on a regular basis	1	2	3	4	5

APPENDIX C

SEM RESULT OF STRUCTURAL MODEL

Estimates (Group number 1 - Partial mediation)
Maximum Likelihood Estimates

Regression Weights: (Group number 1 - Partial mediation)

			Estimate	S.E.	C.R.	P	Label
PN	<---	SN	.247	.044	5.590	***	par_38
DAT	<---	ENC	-.113	.140	-.807	.419	par_39
DAT	<---	PSN	.288	.087	3.325	***	par_40
DAT	<---	EXP	.331	.038	8.819	***	par_44
UWB	<---	PSN	7.231	3.010	2.403	.016	X1
UWB	<---	DAT	7.216	2.663	2.709	.007	X3
UWB	<---	ENC	6.367	4.465	1.426	.154	X5
UWB	<---	PN	.110	.056	1.961	.050	X7
UWB	<---	SN	.044	.038	1.140	.254	X6
UWB	<---	EXP	10.369	1.473	7.042	***	X2
NEU	<---	PSN	-.718	.089	-8.045	***	par_29
EXT	<---	PSN	1.000				
OPN	<---	PSN	.855	.082	10.448	***	par_30
AGR	<---	PSN	.973	.076	12.851	***	par_31
ECO	<---	ENC	1.000				
DUA	<---	ENC	1.315	.216	6.073	***	par_32
TECH	<---	ENC	-1.966	.355	-5.539	***	par_33
NC	<---	UWB	.416	.061	6.878	***	par_34
SK	<---	UWB	1.000				
GD	<---	UWB	1.316	.111	11.889	***	par_35
REG	<---	DAT	1.000				
DP	<---	DAT	.650	.079	8.252	***	par_36
COM	<---	DAT	1.327	.133	9.979	***	par_37
CON	<---	PSN	.763	.094	8.112	***	par_41

Standardized Regression Weights: (Group number 1 - Partial mediation)

			Estimate
PN	<---	SN	.345
DAT	<---	ENC	-.052
DAT	<---	PSN	.181
DAT	<---	EXP	.590
UWB	<---	PSN	.125
UWB	<---	DAT	.199
UWB	<---	ENC	.080
UWB	<---	PN	.105
UWB	<---	SN	.058
UWB	<---	EXP	.508

Notes for Model (Partial mediation)

Computation of degrees of freedom (Partial mediation)

Number of distinct sample moments:	946
Number of distinct parameters to be estimated:	114
Degrees of freedom (946 - 114):	832

Result (Partial mediation)

Minimum was achieved
Chi-square = 1485.375
Degrees of freedom = 82
Probability level = .000

Model Fit Summary

CMIN

Model	NPAR	CMIN	DF	P	CMIN/DF
Partial mediation	114	1485.375	832	.000	1.785
Full Mediation	110	1543.634	836	.000	1.846
Non Mediation	112	1497.148	834	.000	1.795
Saturated model	946	.000	0		
Independence model	43	8377.156	903	.000	9.277

Baseline Comparisons

Model	NFI Delta1	RFI rho1	IFI Delta2	TLI rho2	CFI
Partial mediation	.823	.808	.913	.905	.913
Full Mediation	.816	.801	.906	.898	.905
Non Mediation	.821	.806	.912	.904	.911
Saturated model	1.000		1.000		1.000
Independence model	.000	.000	.000	.000	.000

RMSEA

Model	RMSEA	LO 90	HI 90	PCLOSE
Partial mediation	.044	.040	.047	.998
Full Mediation	.045	.042	.049	.986
Non Mediation	.044	.040	.047	.998
Independence model	.142	.139	.145	.000

Structural Model of Divers' Underwater Responsible Behaviour