A LITERACY MODEL FOR SUSTAINABLE AVITOURISM

by

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ABSTRACT

Avitourism (birding) in South Africa, with remarkable birdlife, provides economic, social and conservation opportunities. Globally, bird species are decreasing rapidly due to environmental degradation and climate change. The dependence of avitourism on natural resources is undisputable, urging further research. Avitourism research is embryonic compared to higher-order tourism markets (i.e. nature-based) and under-researched in the southern hemisphere. Despite increased international scholarship, substantial knowledge gaps remain regarding strategies to enhance sustainable avitourism.

Education, encouraging changes in environmental behaviour, is essential to solve environmental problems. The current day learners influence the future state of the natural environment and consequently the sustainability of avitourism in South Africa. The research therefore aimed to develop a literacy model for sustainable avitourism aimed at secondary school learners in Gauteng (South Africa).

In p*hase 1* of the methodological procedure, mechanisms facilitating behavioural change towards nature were explored. A conceptual literacy framework for sustainable avitourism was developed in *phase 2* (theoretical contribution). *Phase 3*, consisted empirical research. Multi-stage sampling was used to collect primary data by distributing questionnaires at 17 purposively selected secondary schools in Gauteng from July to October 2014. The data were obtained from n = 5 488 secondary school learners (aged 13–17).

Descriptive statistics provided insight into ‘environmental and avitourism literacy’ of the learners. Exploratory- and confirmatory factor analyses (EFA; CFA) and structural equation modelling (SEM) were employed to test the conceptual literacy framework. Obtaining the primary objective, a literacy model for sustainable avitourism was developed and confirmed (empirical contribution). Critical paths were identified in the model to enhance the likelihood of behavioural change. The literacy model could be useful for environmental education and avitourism role-players, assisting in curriculum development and evaluation (practical contribution).

This model could also be applied to other educational contexts, including art and music.

Bird education teaches a love for birds and nature, leading to conservation and sustained birdlife, to ensure avitourism attractions in the future. The development of sustainable avitourism intervention programmes is suggested for further research. Longitudinal research could evaluate the effects of the intervention programmes. Ultimately, the learners of today are the responsible citizens and tourists of tomorrow.

Key terms: Avitourism (birding tourism), sustainable avitourism, sustainable development, environmental education, environmental literacy, environmental and avitourism literacy, environmental behaviour, environmental and avi-orientation, environmental and avi-knowledge, environmental and avi-values, behavioural intention, pro-environmental and avi-behaviour, secondary schools, structural equation modelling.

KGUTSUFATSO

Bohahlaudi bo shebaneng le dinonyana Afrika Borwa, ke bo fanang ka menyetla ya moruo, ya kahisano le polokeho ya hlaho. Lefatsheng ka bophara, mefuta ea dinonyana e theoha ka potlako ka lebaka la ho senyeha ha tikoloho le phetoho ya boemo ba lehodimo. Boitshetleho ba bothori bo ikamahanyang le dinonyana hodima mehlodi ya hlaho, ke ntho e ke keng ya etsetswa kgang, ho tshehetsa dipatlisiso tse ding hape. Dipatlisiso tse mabapi le bohahlaudi ba dinonyana ke tse tswellang pele ha ho bapiswa le dipatlisiso tsa mmaraka wa bohahlaudi ba boemo bo hodimo (bo itshetlehileng ka hlaho) le bo seng hodimo karolong e ka borwa ba kontinente. Ho sa tsotellehe ditsebi tse eketsehileng tsa dithuto tsa matjhaba, ho sa na le dikgeo tse ngata tsa tsebo mabapi le mekgwa ya ho ntlafatsa bohahlaudi ba dinonya hore bo tshehetswe ka nako e telele.

Thuto, diphetoho tse kgothatsang boitshwarong ba tikoloho, ke tsa bohlokwa ho rarolla mathata a tikoloho. Matsatsing la kajeno barutwana ba na le bokgoni ba ho susumetsa boemo ba tikoloho ya tlhaho ya nako e tlang, mme ka lebaka leo, sena se tshehetsa bohahlaudi ba dinonyana ka hara Afrika Borwa. Ka hona dipatlisiso di ne di ne reretswe ho hlahisa motlolo wa tsebo ya ho bala le ho ngola bakeng sa bohahlaudi ba dinonyana hore bo dule bo tshireletsehile, mme sena se reretswe barutwana ba sekolo sa sekondari Gauteng (Afrika Borwa).

Karolong ea 1 ya metjha ya mokhoa wa tshebetso, mekgwa ya ho thusa phethoho ya boitshwaro hodima tlhaho e ile ya hlahlojwa. Moralo wa lenaneo la tsebo ya ho bala le ho ngola bakeng sa bohahlaudi ba dinonyana e tshireletsehileng o ile wa ntlafatswa *karolong ya 2* (tse phehiswang ke teore). *Karolo ea 3*, e ne e entswe ho latela dipatlisiso tse matla. Sampole ya dipatlisiso tse ngata e ne e sebedisetswa ho bokella lesedi la motheo ka ho fana ka mananeo a dipotso disekondaring tse 17 Gauteng ho tloha ka Phupu ho fihlela ka Mphalane 2014. Lesedi le fumanwe ho tswa barutwaneng ba 5 488 ba dikolo tsa disekondari (ba lilemo li 13-17).

Dipalopalo tse hlalosang di fana ka temohisiso ka 'thuto ya tikoloho le ya bohahlaudi ba dinonyana mabapi le tsebo ya ho bala le ho ngola' ya barutwana. Dipatlisiso tsa ho hlahloba le tse netefatsang (EFA; CFA) le mekgwa e metle ya di-ikhweishene

(SEM) di ile tsa sebediswa ho lekola moralo wa thuto ya ho bala le ho ngola. Ho fumana sepheo se ka sehloohong, mokgwa wa ho bala le ho bala o tswetseng pele o ile oa thehwa mme wa tiiswa (monehelo o matla). Mekgwa e boima e ile ya kgethwa ka ho ntlafatsa monyetla wa ho fetoha ha boitshwaro. Motlolo wa ho bala le ho ngola o ka ba bohlokoa bakeng sa thuto ea tikoloho le banka-seabo ba bohalaudi ba dinonyana, ho thusa ntshetsopeleng ya kharikhulamo le dihlahlobo (tlatsetso e sebetsang). Motlolo ona o ka boela oa sebeliswa maemong a mang a thuto, ho kenyeletsa bonono le mmino.

Thuto ea linonyana e ruta lerato bakeng sa dinonyana le tlhaho, e leng se lebisang tlholehong ya dinonyana tse sireletsehileng le tse tsitsitseng, ho netefatsa kgohelo ya bohahlaudi ba dinonyana nakong e tlang. Khatelopele ya mananeo a bohahlaudi bo tsitsotseng e sisintswe bakeng sa dipatlisiso se ding. Phuputso ya nako e telele e ka hlahloba diphello tsa mananeo a ho kenella. Qetellong, barutwana ba kajeno ke baahi ba ikarabellang le bahahlauli ba hosasane.

Mantswe a bohlokwa: Bohahlaudi ba dinonyana bohahlaudi bo tsitsitseng, ntshetsopele e tsitsitseng, thuto ya tikoloho, tikoloho le boithuto bo botle ba ho bala le ho ngola, boitshwaro ba tikoloho, tikoloho le boithuto ba dinonyana, tikoloho le boiphihlelo bohahlaudi, tikoloho le meetlo ya bohahlaudi, maikemisetso aboitshwaro, dikolo tsa disekondari, le sebopeho sa motlolo wa tekano.

OPSOMMING

Avitoerisme (voëlkyk) in Suid-Afrika, met die ongelooflike voëllewe in die land, bied ekonomiese, sosiale en bewaringsgeleenthede. Wêreldwyd is voëlspesies vinnig aan die afneem weens die agteruitgang van die omgewing en oor klimaatsverandering. Die afhanklikheid van avitoerisme op natuurlike hulpbronne is onbetwisbaar, en noodsaak verdere navorsing. Navorsing oor avitoerisme is embrionies vergeleke met hoërorde-toerismemarkte (d.w.s. natuurgebaseer) en daar is nie genoeg navorsing daaroor gedoen in die Suidelike Halfrond nie. Ten spyte van toenemende internasionale vakgeleerdheid, bestaan daar steeds kennis-gapings oor strategieë om volhoubare avitoerisme te bevorder.

Opvoeding wat veranderings in omgewingsgedrag aanmoedig, is noodsaaklik om omgewingsprobleme op te los. Die leerders van vandag beïnvloed die toekomstige toestand van die natuurlike omgewing en gevolglik die volhoubaarheid van avitoerisme in Suid-Afrika. Die navorsing is dus daarop gerig om 'n literêre model vir volhoubare avitoerisme te skep gerig op sekondêre skoolleerders in Gauteng (Suid-Afrika).

In *fase 1* van die metodologiese prosedure is die meganismes wat die gedragsverandering aangaande die natuur fasiliteer, verken. 'n Konseptuele literêre raamwerk vir volhoubare avitoerisme is ontwikkel in *fase 2* (teoretiese bydrae). *Fase 3* bestaan uit empiriese navorsing. Steekproefneming bestaande uit veelvuldige stadiums is gebruik om primêre data in te samel deur vraelyste te versprei onder 17 doelbewus gekose sekondêre skole in Gauteng van Julie tot Oktober 2014. Die data is verkry uit n = 5 488 sekondêre skoolleerders (ouderdom 13 tot 17).

Beskrywende statistiek het insig gelewer oor die "omgewings- en avitoerisme-geletterdheid" van die leerders. Verkennende en bevestigende faktorontledings (EFA; CFA) en strukturele vergelykingsmodellering (SEM) is gebruik om die konseptuele geletterdheidsraamwerk te toets. Om die primêre doel te bereik, is 'n geletterdheidsmodel vir volhoubare avitoerisme ontwikkel en bevestig (empiriese bydrae). Kritieke paaie is geïdentifiseer in die model om die waarskynlikheid van gedragsverandering te bevorder. Die geletterdheidsmodel kan nuttig wees vir

omgewingsonderrig en avitoerisme-rolspelers, deur te help met kurrikulumontwikkeling en -evaluering (praktiese bydrae). Hierdie model kan ook toegepas word in ander opvoedkundige kontekste, insluitende kuns en musiek.

Onderrig oor voëls kweek by leerders 'n liefde vir voëls en die natuur, en dit lei tot bewaring en 'n volhoubare voëllewe om avitoerisme-trekpleisters in die toekoms te verseker. Die ontwikkeling van volhoubare avitoerisme-intervensieprogramme word voorgestel vir verdere navorsing. Longitudinale navorsing kan die uitwerking van die intervensieprogramme evalueer. Uiteindelik is die leerders van vandag die verantwoordelike burgers en toeriste van môre.

Sleutelterme: Avitoerisme (voëlkyktoerisme), volhoubare avitoerisme, volhoubare ontwikkeling, omgewingsonderrig, omgewingsgeletterdheid, omgewings- en avi-oriëntering, omgewings- en avi-kennis, omgewings- en avi-waardes, gedragsbedoeling, pro-omgewings- en avi-gedrag, sekondêre skole, strukturele vergelykingsmodellering

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DECLARATION

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I declare that the above thesis is my own work and that all the sources that I have used or quoted have been indicated and acknowledged by means of complete references.

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N Conradie Date

LIST OF ACRONYMS AND ABBREVIATIONS

2MEV	two-dimensional model of Ecological Values Scale
AMOS	Analysis of Moment Structures software
BFE	birder-friendly establishment
BLSA	BirdLife® South Africa
BMR	Bureau of Market Research
CATES	Children's Attitudes toward the Environment Scale
CBAT	community-based avitourism
CBI	Centrum tot Bevordering van de Import uit Ontwikkelingslanden (Dutch)
CEPS	Children's Environmental Perceptions Scale
CFA	confirmatory factor analysis
CFI	comparative fit index
CHEAKS	Children's Environmental Attitude and Knowledge Scale
CMIN	chi-square value
DBE	Department of Basic Education (South Africa)
df	degrees of freedom
DHET	Higher Education and Training (South Africa)
DSP	dominant social paradigm
DTGS	Domestic Tourism Growth Strategy
dti	Department of Trade and Industry (South Africa)
EA	Efficacy attitudes
EAI	Environmental Attitudes Inventory
EAI-S	Environmental Attitudes Inventory short form
EFA	exploratory factor analysis
ESS	European Social Survey Human Values Scale
GDE	Gauteng Department of Education
GDP	gross domestic product
IAT	Implicit association test
IBAs	Important Bird and Biodiversity Areas
IFI	incremental fit index

IUCN	International Union for Conservation of Nature and Natural Resources
KMO	Kaiser–Meyer–Olkin
LBJ	Little Brown Jobs
MLE	maximum likelihood estimation
MSELI	Middle School Environmental Literacy Instrument
MSELS	Middle School Environmental Literacy Survey
NAAEE	North American Association for Environmental Education
NDP	National Development Plan (South Africa)
NDT	National Department of Tourism (South Africa)
NEETF	National Environmental Education & Training Foundation
NEP	New Environmental Paradigm
NEPS	New Environmental Paradigm Scale
NGO	non-governmental organisation
NGP	National Growth Path (South Africa)
NTSS	National Tourism Sector Strategy
PA	protected area
PAF	principal axis factoring
PEV	Pro-environmental values
RA	Regulations attitudes
RMSEA	root mean square error of approximation
RSPB	Royal Society for the Protection of Birds
SA	South Africa
SANParks	South African National Parks
SAT	South African Tourism
SDG	Sustainable Development Goals
SEM	structural equation modelling
SIT	special interest tourism
SPSS	Statistical Package for the Social Sciences
TA	Technology attitudes
TIES	The International Ecotourism Society
TLI	Tucker–Lewis index

TOI	Tour Operators Initiative
TPB	theory of planned behaviour
UK	United Kingdom
UNCC	United Nations Climate Change
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific and Cultural Organisation
UNISA	University of South Africa
UN-WTO	United Nations World Tourism Organisation
USA	United States of America
WCED	World Commission on Environment and Development
WHO	World Health Organisation
WTTC	World Travel and Tourism Council

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CHAPTER 1: INTRODUCTION TO SUSTAINABLE AVITOURISM RESEARCH

1.1 BACKGROUND TO THE STUDY

The United Nations World Tourism Organisation (UNWTO) (2016:2) describes tourism as key to development, prosperity and well-being. According to the World Travel and Tourism Council (WTTC) (2017a:1), tourism generated US$7.6 trillion (10.2% of global gross domestic product [GDP]) and 292 million jobs in 2016, equivalent to 1 in 10 jobs in the global economy. In South Africa (SA), as in the rest of the world, tourism remains one of the key drivers of the economy, supported 1 533 000 jobs and contributing ZAR402.2 billion (9.3%) to the GDP in 2016 (National Department of Tourism [NDT], 2017:7; WTTC, 2017b:1). A significant trend in tourism demand is that it will continue to grow globally, with international arrivals expected to reach 1.8 billion by 2030, as outlined in the UNWTO long-term forecast, Tourism Towards 2030 (UNWTO, 2011:15; UNWTO, 2016:14). This continued growth of the tourism sector resulted in the need for increased responsibility to advance towards more ‘sustainable tourism’ (UNWTO, 2017a).

Sustainable tourism is “Tourism that takes full account of its current and future economic, social and environmental impacts, addressing the needs of visitors, the industry, the environment, and host communities” (UNWTO, 2017a; United Nations Environment Programme [UNEP] & UNWTO, 2005:11). The 2017 International Year of Sustainable Tourism for Development, declared by the United Nations General Assembly (see UNWTO, 2017a), provides a unique opportunity to advance the contribution of the tourism sector to the three pillars of sustainability: economic, social and environmental sustainability. Furthermore, the 2017 International Year of Sustainable Tourism highlights the potential of tourism to advance the universal 2030 Agenda for Sustainable Development[1] and the 17 Sustainable Development

[1] Transforming Our World: The 2030 Agenda for Sustainable Development is a call for global action to change our world, which is a charter for people and planet in the twenty-first century (United Nations [UN], N.d.(b)).

Goals (SDGs) (UNWTO, 2017a). Figure 1.1 illustrates the role and principles of sustainable tourism.

Figure 1.1: The role and priciples of sustainable tourism

Source: Page and Connell (2014:324)

Figure 1.1 indicates the rationale for developing sustainable tourism and may be a useful framework when sustainable tourism principles are put into practice (Page & Connell, 2014:324). Sustainable tourism principles, guidelines and management practices are applicable to all forms of tourism in all types of destinations, including mass tourism and the various niche tourism[2] markets (UNEP & UNWTO, 2005:11).

[2] According to Novelli (2005:1), 'niche tourism' is defined as an economy of the imagination, where individual preferences and practices are coordinated, packaged and sold. Niche markets are important to tourism as they encourage the diversification of products, assist in growing tourism numbers, offer high yields of foreign

Considerable growth in interest and participation in avitourism, one niche tourism market, is reported in literature (Kim, Keuning, Robertson & Kleindorfer, 2010:227).

Avitourism[3] (birding tourism), is identified as a growth area and growing trend in tourism (Chen & Chen, 2015:416; Cordell & Super, 2000:135; Sekercioğlu, 2002:282; Wheeler, 2008:208). The continued growth in this market has led to the significant development of the birding industry offering specialised birdwatching trips (Jones & Buckley, 2001:228; Kim *et al*., 2010:228; Wheeler, 2008:208). In the United States of America, for example, there were approximately 47 million birdwatchers older than 16 years in 2011, of whom 20% left their country to perform birdwatching activities as avitourism. Furthermore, birdwatching in the United States for that year generated about 40 942 000 dollars directly, created 666 000 jobs and generated $106 977 000 of economic benefit indirectly (US Fish & Wildlife Service, 2014). The birdwatching market forms the largest sub-segment within wildlife watching tourism and ecotourism segment as it now has become important in the broader nature-based tourism industry (Biggs, 2013:394; Kim *et al*., 2010:227; Newsome, 2017:2; Rogerson, Simango & Rogerson, 2013:122; Sekercioğlu, 2002:282; South Africa Department of Trade and Industry [dti], 2010:12).

Avitourism, based on sustainability principles, has the potential to contribute to local communities, educate local people about the value of biodiversity and create local and national incentives for the preservation of birds and natural areas (Sekercioğlu, 2002:282). As avitourism is an environmentally conscious activity, it provides economic hope to many threatened natural areas around the world (Cordell & Herbert, 2002:54). These benefits can be summarised as economic, social and conservation benefits induced from avitourism:

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exchange earnings and consumer spending, stimulate creation of quality jobs that require specialist skills and encourage geographic distribution of tourism benefits (Rogerson, 2011:199; dti, 2010:83).

[3] Birdwatching, or the birding activity, is referred to as 'avitourism' (birding tourism) if the birder takes a trip a mile (1.6 km) or more from home for the primary purpose of observing birds (La Rouche, 2003:4). Currently in South Africa, 'avitourism' is defined in the National Avitourism Strategy (NDT, 2011a:10) as travel by birdwatchers, domestically and internationally, outside of a person's usual environment for the purpose of viewing birds in their natural habitats.

1. *Economic benefits*: foreign exchange earnings from money spent on birding trips, including travel costs, accommodation, food and beverage, and sales of souvenirs etc.; government income taxes; and employment generation.
2. *Social benefits*: stimulation of regional and rural development; alternative sources of income and employment for local communities; participatory tourism planning processes and the involvement of relevant stakeholders; local communities gaining a greater awareness of conservation of the natural and cultural resources, thus integrating conservation and rural development; cooperation of local communities through tourism awareness and benefit-sharing.
3. *Conservation benefits*: local awareness of the values of biodiversity, and the conservation of natural resources and bird species; guiding and good interpretation, providing high-quality visitor experiences and ensuring good visitor behaviour.

South Africa could enhance the potential share in these benefits by developing avitourism in a sustainable manner. South Africa hosts a wide diversity of bird habitats (e.g. the Cape Floral Kingdom, Succulent Karoo, as well as savanna and grassland biomes), bird species (850 species), and high levels of endemism[4] (171 occur in Southern Africa alone) (Chittenden, 2007; Hockey, Dean & Ryan, 2005; Marnewick, Retief, Theron, Wright & Anderson, 2015:19). Due to a wealth of bird species and diversity of bird habitat, South Africa has the opportunity to capitalise on its remarkable wealth of birdlife by developing avitourism, while simultaneously improving the economic, social and environmental well-being of the country.

BirdLife® South Africa (BLSA), country partner to BirdLife® International, is the bird conservation organisation of the country and strives to conserve birds, their habitats and biodiversity through scientifically-based programmes, through supporting the sustainable and equitable use of natural resources and through encouraging people to enjoy and value nature (BLSA, N.d.(b)). BLSA also aims to promote South Africa as a top-class birdwatching destination that is vital for the long-term conservation of

[4] Endemism refers to "the degree to which the plants and animals of a particular area are both native and retricted to it" (Oxford English Dictionary, N.d.)

the wild birds of the country and their habitats (BLSA, N.d.(b)). Various elements of avitourism, namely BirdLife South Africa Birding Routes, birder-friendly establishments (BFE), birder-friendly tour operators, and community bird guide training programmes are managed by BLSA (BLSA, N.d.(b)).

Furthermore, the importance of birding in South Africa is recognised by South African Tourism (SAT), the national marketing body for tourism to and within South Africa, which markets South Africa as a top birding destination, offering a considerable variety of birds, well-developed international and domestic transport systems and a user-friendly and supportive avitourism industry (SAT, N.d.).

Government support for avitourism is linked to development in rural areas, with the potential to reduce widespread poverty and high levels of unemployment as highlighted in the National Development Plan (NDP) and the National Tourism Sector Strategy[5] (NTSS) (NDT, 2011a:7; NDT, 2017:31). Avitourism has become incorporated into national tourism planning for South Africa. The final draft of the National Avitourism Strategy of South Africa set out the country's vision of "positioning South Africa as a globally competitive avitourism destination" (NDT, 2011b:12). Furthermore, the Domestic Tourism Growth Strategy 2012–2020 (see NDT, 2012) identified niche tourism markets, including avitourism as a trend influencing tourism development (NDT, 2012:3). Special interest groups, such as avitourists, have been incorporated into this strategy to increase domestic tourism revenue in South Africa (NDT, 2012:10).

Furthermore, according a research study conducted by Department of Trade and Industry (dti) in South Africa, statistics suggest that avitourists spend an estimated ZAR927 million to ZAR1.725 billion on birding trips, support services and equipment annually. The research further found the potential contribution of avitourism to GDP to be in the range of ZAR1.205 billion to ZAR2.243 billion annually (dti, 2010:9). These figures indicate the potential of avitourism to contribute to economic development as required by NDP of South Africa (dti, 2010:17).

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[5] The National Tourism Sector Strategy (NTSS) in South Africa provides a blueprint for the tourism sector in its pursuit of growth targets contained in the National Growth Path (NGP) (NDT, 2016:18). The NDP of South Africa and the 2030 vision for the country recognise tourism as one of the main drivers of employment and economic growth. The NGP includes tourism as one of the six pillars of economic growth (NDT, 2016:18).

The current position of South Africa as a birding destination for avitourism can be summarised as follows:

- the country is classified as a rich birding country, based on the wide diversity of bird habitats, remarkable wealth of birdlife, and large variety and number of bird species as well as endemic birds;
- well-developed infrastructure;
- represented by BirdLife® South Africa (BLSA), which focuses on bird conservation and avitourism development in the country, as well as planning and managing well-established birding routes;
- a supportive avitourism industry;
- government support for avitourism linked to development in rural areas, with the potential to reduce poverty and high levels of unemployment; and
- the avitourism industry contributing to economic growth in South Africa.

Considering the current position that South Africa holds as a birding destination and the potential benefits of avitourism, the government of South Africa, in the NTSS, identified research clusters regarded as critical in the development and growth of the tourism sector. This study focused on the NTSS niche tourism market cluster, more specifically, avitourism (NDT, 2011b:22). The problem statement of the study is discussed in the next section.

1.2 PROBLEM STATEMENT

Avitourism (travel for the specific purpose of birdwatching), an example of niche tourism, is identified as a growth area and a trend in tourism (Biggs, Turpie, Fabricius & Spenceley, 2011:80; Cordell & Super, 2000:135; Kronenberg, 2016:79; NTD, 2011b:10; Wheeler, 2008:208). Although a considerable growth in interest and participation in birdwatching is reported in literature (Kim *et al*., 2010:227), researchers are also attracted to the avitourism market because of the potential economic, social and conservation benefits (Biggs *et al*., 2011:80; Chen & Chen 2015:416; Kronenberg, 2014:617; Sekercioğlu, 2002:282). Various research studies have focused on the potential development of avitourism to different countries and regions throughout the world (Biggs *et al*., 2011:80; Steven, Morrison & Castley 2015:1258).

Research studies on avitourism are representative of all continents of the world and are reported alphabetically according to country:

- Australia (e.g. Connell, 2009; Green & Jones, 2010; Jones & Nealson, 2005; Kim *et al*., 2010);
- Brazil (Bernardon & Nassar, 2012);
- Canada (Hvenegaard, Butler & Krystofiak, 1989; Maple, Eagles & Rolfe, 2010);
- China/Hong Kong (Cheung, Lo & Fok, 2017; Li, Zhu & Yang, 2013; Ma Cheng, Wang & Fu, 2013, Wong, 2009);
- Ecuador (Welford & Barilla, 2013);
- Korea (Lee, Lee, Kim & Mjelde, 2010);
- Mexico (Revollo-Fernández, 2015);
- Namibia (Hottola, 2009);
- New Zealand (Kaval & Roskruge, 2009);
- Papua New Guinea (Lyons, Markwell & Johnson, 2009);
- Peru (Puhakka, Salo & Sääksjärvi, 2011);
- Poland (Czajkowski, Giergiczny, Kronenberg & Tryjanowski, 2014; Kronenberg, 2014; 2016);
- South Africa (Conradie & Van Zyl, 2013; 2016; Conradie, 2015; Conradie, Van Zyl & Strasheim, 2013; Rogerson *et al*., 2013; Biggs *et al*., 2011; Simango, 2011);
- Thailand (Hvenegaard, 2002);
- the United States of America (USA) (Eubanks, 2010; Hill, Cable & Scott, 2010; La Rouche, 2003; Lawton, 2009; Lawton & Weaver, 2010; Scott & Thigpen, 2003; Stoll, Ditton & Eubanks, 20063);
- the United Kingdom (UK) (Booth, Gaston, Evans & Arnsworth, 2011; Jackson, 2007);
- Turkey (Cakici & Harman, 2007; Sari, Oban & Erdogan, 2011); and
- Uganda (Nantongo, Nalwanga & Alinaitwe, 2007).

Because of the socio-economic importance of avitourism, various dimensions of avitourism have been addressed in literature (Lee *et al.*, 2010:697; Steven *et al*., 2015:1264) and are reported based on the quantitative systematic literature review of Steven *et al*. (2015:1257).

The quantitative systematic review of birdwatching and avitourism by Steven *et al*. (2015:1257), consisting of 66 studies, presents a summary of the global avitourism research effort. Table 1.1 summarises the quantitative systematic review of avitourism literature studies (1989–2014) according to the key objectives of the study, the theme of the publication and the methodological approach used in the studies (Steven *et al*., 2015:1264). Table 1.1 is organised according to the number of studies examining avitourism, in descending order.

Table 1.1: Key objectives, theme of publication and methodological approach versus the number of studies (1989–2014) examining avitourism

Categories of avitourism research	Number of studies
Key objectives of the study	
Economic benefit	21
Birder motivations	18
Conservation	15
Market understanding	12
Destination features (birds/biological)	10
Birder specialisation	9
Negative outcomes	6
Birder demographics	6
Protected area (PA) management	5
Community development	5
Sustainability	5
No specific questions	3
Theme of publication	
Tourism	21
Natural resource management	10
Natural Science	8
Social	7
Ornithological	7
Other	7
Conservation	5
Thesis	5

Categories of avitourism research	Number of studies
Geography	3
Methodological approach	
Survey tourists	35
Survey operator	13
Secondary data analysis	11
Biological	9
Literature review	8
Commentary	8

Source: Steven *et al*. (2015:1264)

Evident from Table 1.1, a large proportion of the research examined *economic benefits* and *motivational attributes* of avitourists as the dominant research strands in avitourism research. Furthermore, the review highlighted the multi-disciplinary nature of avitourism research as illustrated in the various themes of publication, including tourism, natural resource management, natural and social sciences, sciences and ornithological perspectives. In the majority of the reviewed studies, questionnaire surveys to avitourists and avitourism operators were used to collect primary data. While collecting information on birder motivations and quantifying the economic benefits to local communities are very important to enhance avitourism, so too is the conservation of the desired product that avitourists want to see (i.e. birds, bird diversity, endemic species and rarities, and bird habitat are important pull factors in avitourism) (Steven *et al*., 2015:1268).

Although the importance and value of avitourism as a niche market are recognised in the academic world (see Table 1.1), Steven *et al*. (2015:1258) suggest that research in avitourism is still relatively embryonic compared to higher-order markets such as nature-based or wildlife tourism and they therefore highlight future research priorities to inform sustainable avitourism management. Substantial knowledge gaps remain with regard to the importance of the birds themselves in the development of avitourism products (Steven *et al*., 2015:1270). Since the dependence of avitourism on avian conservation is undisputable, further research is required to address how avitourism could move forward both as an industry and as a mechanism to enhance avian conservation (Steven *et al*., 2015:1270). Furthermore, an enhanced understanding of the knowledge avitourists have about avian conservation may also shed light on the importance and value they place on species and habitat conservation. Since the sustainability of the avitourism industry is dependent on the conservation of birds and the natural environment, the attitudes avitourists have towards birds, bird habitats and bird conservation have become increasingly important. Given that birders, birdwatching and birds within their natural environment are interdependent, collaboration between the social, economic and ecological science communities is needed (Steven *et al*., 2015:1270).

The same authors revealed that in their review of birdwatching and avitourism literature (Steven *et al*. 2015:1267), it was found that studies conducted in the northern hemisphere dominated those from the southern hemisphere. This clearly indicates a need for avitourism research on the African continent. Despite Africa's richness of bird diversity (2 316 extant bird species) and endemism (305 species found only within Africa), it is surprising that limited research studies have assessed avitourism in Africa (Steven *et al*., 2015). Further research is needed to get a better understanding of avitourism products and avitourist desires, which could guide avitourism development in Africa, more specifically South Africa (Steven *et al*., 2015:1267).

Evident from the previous research discussed, and for the purpose of this study, the following six areas are considered important for future research (Steven *et al*., 2015).

1. The conservation of the desired product that avitourists want to view – birds, bird diversity, endemic species and rarities, and bird habitats are important pull factors in avitourism.
2. Addressing how avitourism could move forward both as an industry and as a mechanism to enhance avian conservation.
3. Enhancing an understanding of avitourists' knowledge about avian conservation and the importance and value they place on species and habitat conservation.
4. Examining the attitudes avitourists have towards birds, bird habitats and bird conservation, since the sustainability of the avitourism industry is inseparably linked to the conservation of both birds and their natural habitats.

5. Integrated research that combines social, economic and ecological perspectives provide a holistic view, highlighting the need and importance of inter-disciplinary research in avitourism.
6. Research should focus on under-researched regions, including the southern hemisphere as well as those developing countries in need of strategies to enhance sustainable development, such as South Africa.

In the interests of economic, social and environmental sustainability of avitourism in South Africa, the protection and conservation of birds and their natural habitats are imperative and were highlighted as priority research in this field. Sustainable avitourism in South Africa, the focus of this study, requires appropriate infrastructure for tourism activities, stability in socio-economic systems as well as the natural resource base – avian habitats – for travellers to observe birds in the wild (Steven *et al*., 2015:1270).

However, the problem is that the natural resource base is under increasing pressure to bring about economic growth (Bramwell & Lane, 2013:1). To survive, humans rely on the earth's natural resources, and to make a living, humans need air, sufficient water, shelter, infrastructure (roads, electricity and sewage systems) and job opportunities (Van As, Du Preez, Brown & Smit, 2012:408). Humans have had a tremendous impact on the environment, since human population growth, activities and technological abilities introduced environmental problems (De Beer, Dreyer & Loubser, 2017:1). Amongst others, these are habitat destruction and degradation, deforestation, habitat fragmentation, and pollution (air, soil, water and noise) (De Beer *et al*., 2017:3; Van As *et al*., 2012:409,412). The cumulative effect of these impacts is compromising the natural resource base on which birdlife depends and also causes increased levels of climate change (McKechnie, 2013:36).

"Climate change, on account of its pervasiveness and potential to affect virtually every ecosystem on the planet, has rapidly risen to prominence on the agendas of scientists and conservationists" (McKechnie, 2013:36). A recent example is the new Paris Agreement (see United Nations Climate Change [UNCC], 2016) ushering in a new global agenda on climate change (Njenga, 2016:i). Climate envelope modelling, one of the most widely used approaches to predict how birds will respond to climate change, suggests that there may be serious challenges ahead for many African birds (McKechnie, 2013:36). By 2050, some South African bird species associated with Fynbos, Mountain grasslands and Karoo biomes will lose substantial fractions of their ranges (McKechnie, 2013:36).

Analysis of the changes in threat status of the world's birds over the past two decades shows that, despite the conservation efforts of governments and non-governmental organisations (NGOs) across the world, birds as a group are increasingly becoming threatened (BirdLife International, N.d.). Currently, South Africa supports 850 bird species, of which 92 bird species are classified as globally threatened or near threatened according to the IUCN Red List of Threatered Species, while 130 are classified as regionally threatened or near-threatened (Marnewick *et al*., 2015:19). Moreover, the Red Data Book of Birds of South Africa, Lesotho and Swaziland indicates the rise of critically endangered (13) and endangered (38) bird species (Taylor, Peacock & Wanless, 2015:29,71). There is therefore global concern about the ability of the earth's environment and resources to sustain the continued expansion of economic activity (Page, 2013:3). Over the past years, the problems relating to environmental degradation have been recognised across various disciplines and steps have been taken to advocate sustainable development[6] on a global scale.

It seems that the steps that have been taken so far provide a beginning, but they are not remotely enough (Bramwell & Lane, 2013:1). A primary constraint on sustainable development as indicated by Urry (2011:55) is that today's world is characterised by pervasive consumerism and people have formed habits to social practices that are resource-intensive and involve, for example, greenhouse gas emissions. Urry (2011:122) emphasises that habits and behaviours of society are not easy to change; social systems therefore need to be changed through the encouragement of positive alternatives to high carbon lives.

[6] According to the Brundtland Report (see World Commission on Environment and Development, 1987:8), where it was first defined, sustainable development is "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (UN World Commission for Environment and Development, 1987, cited in Keyser, 2009:20).

Urry (2011:132) suggests an alternative lifestyle that is “fashionable and faddish, that wins the hearts and minds, that is better and more fun”. Wheeler (2012:123) proposes that, to respond to the current sustainability crisis, there is a need to improve our ‘social ecology’, which involves changes in values, mind-sets and social organisations. According to Wheeler (2012:123), educational strategies play a key role to encourage public understanding of the current sustainability issues. Ultimately, changes in mind-sets and values are depicted as highly important (Wheeler, 2012:123). According to van As *et al*. (2012:412), it is unthinkable that humans who are products and beneficiaries of biodiversity could be uncaring of our rich environment and cause the desecration thereof. The above authors attribute such destruction to ignorance, highlighting the need of education for individuals, corporations and governments. According to Saylan and Blumstein (2011:157), “environmental education is our best hope for solving our current environmental problems”.

In summary, these scholars highlight the key role of education that will encourage changes in values, mind-sets and behaviour concerning the sustainability crisis and problems relating to environmental degradation. Education, which will win the hearts and minds of people, is therefore identified as one aspect that could contribute to overcoming the obstacles to progress towards sustainable avitourism. Ultimately, only education can create the level of environmental literacy needed to sustain birdlife, the natural environment in which birds live, and the resource base needed to support sustainable avitourism (Elder, 2003:4).

From the environmental education and environmental literacy domains, environmental literacy is identified as an approach to promote pro-environmentalism over the long term and to improve the environmental attitude and behaviour of all citizens (including secondary school learners). Environmental literacy is described as the ‘intended outcome of the process of environmental education’ (Elder, 2003:7; Erdoğan, 2009:37; Farber, 2015:17; Igbokwe, 2012:649). This process is portrayed through five steps “climbing the environmental literacy ladder” from general environmental awareness to collective action for the environment (Elder, 2003:7).

Since the present study focused on education relating to birds and the natural environment in which birds live, a study by Can, Lane and Ateşkan (2017:733) highlighting the role of birdwatching activities to promote bird and environmental education is also included here. In today's world, people have lost contact with nature (Larson, Green & Cordell, 2011). Increasingly, people stay indoors and, when outside, they are looking down at their mobile devices (Can *et al*., 2017:733). Watching birds and appreciating bird habits and migrations provide great opportunities to reconnect with nature, to investigate the community, and to learn about global connections, and therefore could contribute to the development of environmental literacy (Can *et al*., 2017:733). In addition, an awareness of birds since a young age, teaches a love for birds and nature as a whole and could lead to motivation to love, conserve and sustain birdlife over a lifetime (McColaugh, 2007:6).

In summary, the present study targeted a proportion of the youth (13–17 years) at secondary school (i.e. high school) level to raise the interest of learners about birds and their role in maintaining biodiversity. Educating the youth today is the key to provide the foundation of action for an equitable and sustainable world in the future (UNEP, 2017). Current-day school learners will have a major influence on the future state of the natural environment (including birds and bird habitats), which makes innovative ways of interactive learning and engagement at school level about environmental sustainability highly relevant.

Although the involvement of the youth (in this case, secondary school learners, aged 13–17 years) plays a key role in the future sustainability of birds and bird habitats, a research study on the effect of birdwatching on mood states of secondary school learners (Cobar, Borromeo, Agcaoili & Rodil, 2017:18) found that birdwatching activities could also contribute to the learners' wellness. The same authors' results indicated a significant decrease in tension, confusion and fatigue scores among secondary school learners after a 20-minute birdwatching activity (Cobar *et al*., 2017:18). As birdwatchers enjoy the psychological tranquillity of being in nature, conservation potential is being developed with wildlife recreation (Cobar *et al*., 2017:18). Furthermore, findings have shown elevated rates of conservation behaviour among birdwatchers and wildlife recreationists (Cooper, Larson, Dayer, Stedman & Decker, 2015:446) while the influence of nature on humans brings the issue of reasonable consumption to their consciousness (Cobar *et al*., 2017:20; Watson, 2010). Thus, when the youth forges personal connections to nature, the benefits to individual and societal health are lasting laying a foundation for lifelong support of nature conservation (International Union for the Conservation of Nature [IUCN], 2017).

In an attempt to solve the problem of environmental sustainability partially, this research aimed to investigate how environmental and avitourism literacy could be encouraged amongst secondary school learners. Ultimately, the secondary school learners of today are the public leaders, business operators as well as tourists of tomorrow.

The theoretical contribution of this study is to apply concepts taken from the domains of environmental education, environmental literacy and/or environmental psychology to the context of the present study, namely birds, the natural environment in which birds live, and avitourism, thus contributing to the body of knowledge in the tourism management field. The environmental and avitourism literacy components presented in the conceptual literacy framework of sustainable tourism were tested empirically, providing an empirical contribution. Based on the insight from this study, gained from a theoretical as well as an empirical perspective, a final literacy model for sustainable avitourism was envisaged, which will be useful to conservation, environmental education and avitourism stakeholders, thus providing the practical contribution of this study.

To address the research problem outlined above, the following research objectives have been set.

1.3 RESEARCH OBJECTIVES

The primary and secondary objectives of the present study are outlined next.

1.3.1 Primary objective

To develop a literacy model for sustainable avitourism aimed at secondary school learners in Gauteng (South Africa).

1.3.2 Secondary objectives

In order to achieve the primary objective, the following secondary objectives were identified, namely to –

1. explore mechanisms and approaches aimed at facilitating behavioural change among secondary school learners towards birds and the natural environment;
2. conceptualise sustainable avitourism, environmental and avitourism literacy, environmental and avi-orientation, environmental and avi-knowledge, environmental and avi-values, behavioural intention, actual pro-environmental and avi-behaviour and behavioural involvement in birds, the natural environmental and avitourism from existing literature;
3. develop a conceptual literacy framework aimed at facilitating behavioural change in secondary school learners' behaviour towards birds, the natural environment and avitourism;
4. determine secondary school learners' environmental and avi-orientation, environmental and avi-knowledge, environmental and avi-values, behavioural intention, actual pro-environmental and avi-behaviour, and behavioural involvement in birds, the natural environment and avitourism;
5. test the conceptual literacy framework empirically for sustainable avitourism though structural equation modelling (SEM);
6. explore the role of behavioural involvement (in birding and avitourism) of secondary school learners in the literacy model for sustainable avitourism; and
7. draw conclusions from and to make recommendations based on the results of the study, and to propose a literacy model for sustainable avitourism.

1.4 RESEARCH METHOD OF THE THESIS

The methodological procedure was operationalised in three phases as illustrated in Figure 1.2.

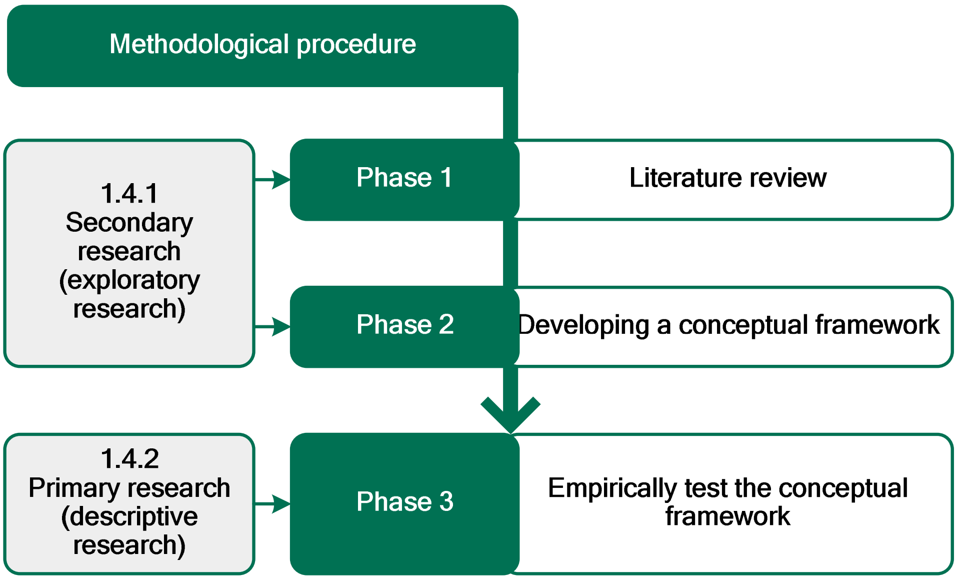


Figure 1.2: Methodological procedure of this study

The research method utilised for this thesis was secondary research,[7] comprising the literature review (*phase 1*) and the development of a conceptual framework (*phase* 2). In the primary research conducted for this study, the conceptual literacy framework for sustainable avitourism was tested empirically, in *phase* 3. The secondary research is discussed next.

1.4.1 Secondary research

It is imperative that the research topic be thoroughly conceptualised and that existing literature or the available body of knowledge be consulted (Finn, Elliott-White & Walton, 2000:89; Mouton, 2001:87). A literature review was undertaken and was operationalised in two phases (see Figure 1.2), as reported in Chapters 2 and 3 respectively.

In *phase 1*, a variety of sources of information were utilised as part of the literature review, including the following (De Vos, Strydom, Fouché & Delport, 2012:137–139; Mouton, 2001:88): books, articles in professional journals, statistical abstracts,

[7] *Secondary research* is defined as the collection of studies previously published by other authors on a topic for their own purposes (Cooper & Schindler, 2014:130; Hofstee, 2006:91; Neuman, 2007:69).

theses and dissertations, presentations at conferences, symposia and workshops, Internet websites, and electronic databases (for example, the library catalogue, EBSCOhost: Academic Search Premier, Hospitality & Tourism. ABI/INFORM. ScienceDirect and Emerald Full Text).

The literature review for this thesis conceptualised prior research relating to:

- sustainable tourism and avitourism, including related terms such as 'birdwatching', 'birding', 'birder' and 'avitourist'
- environmental education and environmental literacy
- five components, from the environmental education and environmental literacy domains were identified as possible mechanisms that could bring about change in secondary school learners' behaviours, mind-sets and attitudes towards the sustainability of birds and the environment. A separate literature search was conducted on each of these components: namely, environmental orientation (environmental awareness and affinity), environmental knowledge, environmental attitudes and values, behavioural intention (intention to act, verbal commitment) and pro-environmental behaviour (responsible environmental behaviour, significant environmental behaviour, actual commitment)
- behavioural involvement from the consumer behaviour and tourism domains.

In *phase 2* of the literature review, a conceptual literacy framework for sustainable avitourism was developed, based on the literature review conducted in *phase 1* (see Chapter 3).

1.4.2 Primary research

In *phase 3* of the study (see Figure 1.2), primary data were obtained from original research and consisted of information collected by the researcher for the purposes of the study (Welman, Kruger & Mitchell, 2009:149). The primary research was conducted to achieve the aim and to address the research objectives of the study. The primary research process followed in this study is discussed next.

The *first step* of the primary research process was to select a research design. The research was of an empirical nature, using a quantitative cross-sectional survey to collect primary data, thus reflecting the positivist paradigm.

The *second step* was to select and develop a sampling plan. The survey population for the present study was secondary school learners in Grades 8, 9 and 10 (aged 13–17) who attended secondary schools in Gauteng (South Africa) during July to October in 2014. This target group was chosen since educating the youth was highlighted as fundamental to ensuring action for an equitable and sustainable world (UNEP, 2017).

The sampling frame for the present study included a spreadsheet register of school districts in Gauteng, listing all the secondary schools in Gauteng, which was provided by the Gauteng Department of Education (GDE, 2014). A multi-stage sampling approach (see Figure 4.5), was followed to draw the sample from the target population. Official permission from the GDE was obtained to conduct research amongst four school districts in Gauteng. From the sample frame (see section 4.3.2) 20 secondary schools were purposively selected to ensure representivity regarding language, race and socio-economic circumstances. Gr 8, 9 and 10 learners (ages ranging from 13–17 years old) were purposively selected due to the availability of the learners during the period of data collection. Non-probability sampling (purposive sampling) was used based on the data collection procedure. A total number of 17 secondary schools from the four school districts participated in the study. A self-administered questionnaire was made available to all learners in Grades 8, 9 and 10. A census was thus conducted of all the Grade 8, 9 and 10 learners at the invited secondary schools during the data collection period, not a sample.

The number of learners enrolled at secondary schools in Gauteng in 2014 was used as a guideline to determine an appropriate sample size (see section 4.3.4). For the present study, based on 2014 figures, the total population (N) of secondary school learners in Gauteng was 470 238 learners (Department of Basic Education [DBE], 2016:8–9). The guidelines of Cooper and Emory (1995:207), and Krejcie and Morgan (1970:608) to determine the sample size were used. The table for determining the sample size from a given population shows that for a population (N) of 470 238, the recommended sample size (n) is 384 (Krejcie & Morgan, 1970:608). The information reported in the present research was provided by a total of n = 5 488 respondents (secondary school learners, Grades 8–10) in Gauteng (SA). The sample size met the requirements for further data analysis and model building. Although the actual sample size (n = 5 488) was substantially larger than the recommended sample size (n = 384), the study does not claim to have a representative sample of the population.

The *third step* was to select and develop the research instrument. A questionnaire was developed, with questions related to the six constructs that were investigated for the study (see Appendix A: Final questionnaire). The questionnaire consisted of seven sections (A–E2) and the questions were based on existing measuring scales used in previous research (Larson, Green & Castleberry, 2011; McBeth *et al*., 2011; Bogner & Wiseman, 2006; Leeming *et al*., 1995), as well as the literature review conducted for the study (see Chapter 3).

In Section B2, binary questions were posed to secondary school learners to measure self-reported behavioural involvement in birding and avitourism. In Section C, learners' knowledge of birds and the environment was measured using a five-point multiple-choice response format allowing learners to select the correct answer from the listed choices. A Likert-type scale was used in Sections B1, D, E1 and E2 of the questionnaire. The applicable Likert-type scale used for each section is shown in Table 1.3 (see Appendix A).

Table 1.2: The applicable Likert-type scale used in the questionnaire

Section in questionnaire	Applicable Likert-type scale used				
	1	2	3	4	5
Section B1, and D	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
Section E1	Not at all true of me	Slightly true of me	Somewhat true of me	Very true of me	Extremely true of me
Section E2	Never	Seldom	Sometimes	Often	Always

In Sections B1 and D, respondents had to indicate the level of agreement or disagreement to each statement on a scale of 1 (strongly disagree) to 5 (strongly agree). In Section E1, a semantic differential scale ranging from "not at all true of me" to "extremely true of me" was used to measure learners' intended pro-environmental and avi-behaviours. In Section E2, respondents had to indicate differences in the degree of regularity of actual pro-environmental behaviour, using a polychromous scale ranging from “never” to “always” for each statement.

The *fourth step* was to conduct a pilot test. Two renowned ornithologists (specialists in bird studies), were identified and asked to provide their opinion on the questionnaire (Kemp, 2014; Peacock, 2014). Minor modifications were implemented on the basis of their recommendations, after which the questionnaire for the study was pre-tested. The questionnaire was tested on the research population, comprising secondary school learners in Grades 8 to 10 during June and July in 2014. The questionnaire for the pilot study included six major constructs and 107 variables. Two different schools in Gauteng were identified to participate in the pilot test. One school was located in Johannesburg and the other located in Pretoria. A total of 367 secondary school learners participated in the pilot test and the sample was fairly equally distributed between gender (boys, 50.40%; girls, 49.60%) and school grade levels (Grade 8, 34.0%; Grade 9, 30.7%; Grade 10, 35.4%). After the questionnaires were analysed, minor changes were made. Since the questionnaire was too lengthy, the variables were reduced to 74 variables to measure the six constructs of the study.

The *fifth step* was to conduct the fieldwork for the study. Self-administered questionnaires were distributed to learners in Grades 8, 9 and 10, at 17 secondary schools in four Gauteng school districts. The school principals or relevant teachers provided an indication of the number of questionnaires that had to be provided to each school. The correct number of questionnaires was packed according to the number of learners in each school grade. Based on individual arrangements per school and the availability of school learners, the questionnaires were distributed to Grade 8, 9 and 10 learners. The researcher and fieldworkers (teachers of participating schools), conducted the fieldwork. Fieldworkers were asked to read the cover page to the learners and to explain the aim of the research, that the information provided by each participant would be confidential, and read the instructions to complete the questionnaire.

The *sixth step* was data processing. This included editing, coding and capturing the data. Data editing consisted of examining all completed environmental and avitourism-literacy questionnaires in order to identify and minimise errors, incompleteness and misclassification (Kumar, 2011:255). Data coding was done by means of pre-coding. The data was captured, since each variable in the questionnaire was entered into a database by data typists.

Data analysis was the *seventh step* in the research process. Descriptive statistics were used first to characterise and profile the respondents (secondary school learners in Gauteng), and secondly to describe the characteristics of the sample taken, for each of the six constructs as reflected in sections A–E2 of the questionnaire (see Appendix A: Final questionnaire) (Leedy & Ormrod, 2010:265). Further, multivariate statistical techniques were applied to the data, namely confirmatory factor analysis (CFA), exploratory factor analysis (EFA) and SEM. First, CFA was employed (to sections B1 and D of the questionnaire) to test whether the categories found in previous exploratory research could be confirmed in this study. If the CFA did not show an acceptable fit, an EFA was conducted. The aim of the EFA was to investigate the underlying structure of the data and whether or not it could be simplified into one or more factors. Since new items were included in Sections E1 and E2 in the questionnaire, only the EFA were employed in these sections.

SEM was employed to test the conceptual literacy framework for sustainable avitourism, which was based on existing literature (see Figure 3.1). In order to understand the role and relationships of each of the constructs in the proposed conceptual framework, the relationships within and across each of the building blocks towards the final model were tested, using SEM. For the purpose of this study, model refers to the literacy model for sustainable avitourism that was developed and confirmed based on the SEM results (see Figure 7.5).

The *eighth and final step* was to present the research results. Descriptive statistics, CFA, EFA and SEM results are presented in Chapters 5 and 6 of the thesis, while conclusions and recommendations, based on the results, are made in Chapter 7.

The research design and method used in the present study are discussed in more detail in Chapter 4. The key terms used in the study are discussed next.

1.5 DEFINITIONS OF TERMS

This section defines the key terms frequently used in this thesis, as illustrated in the flow diagram in Figure 1.3.

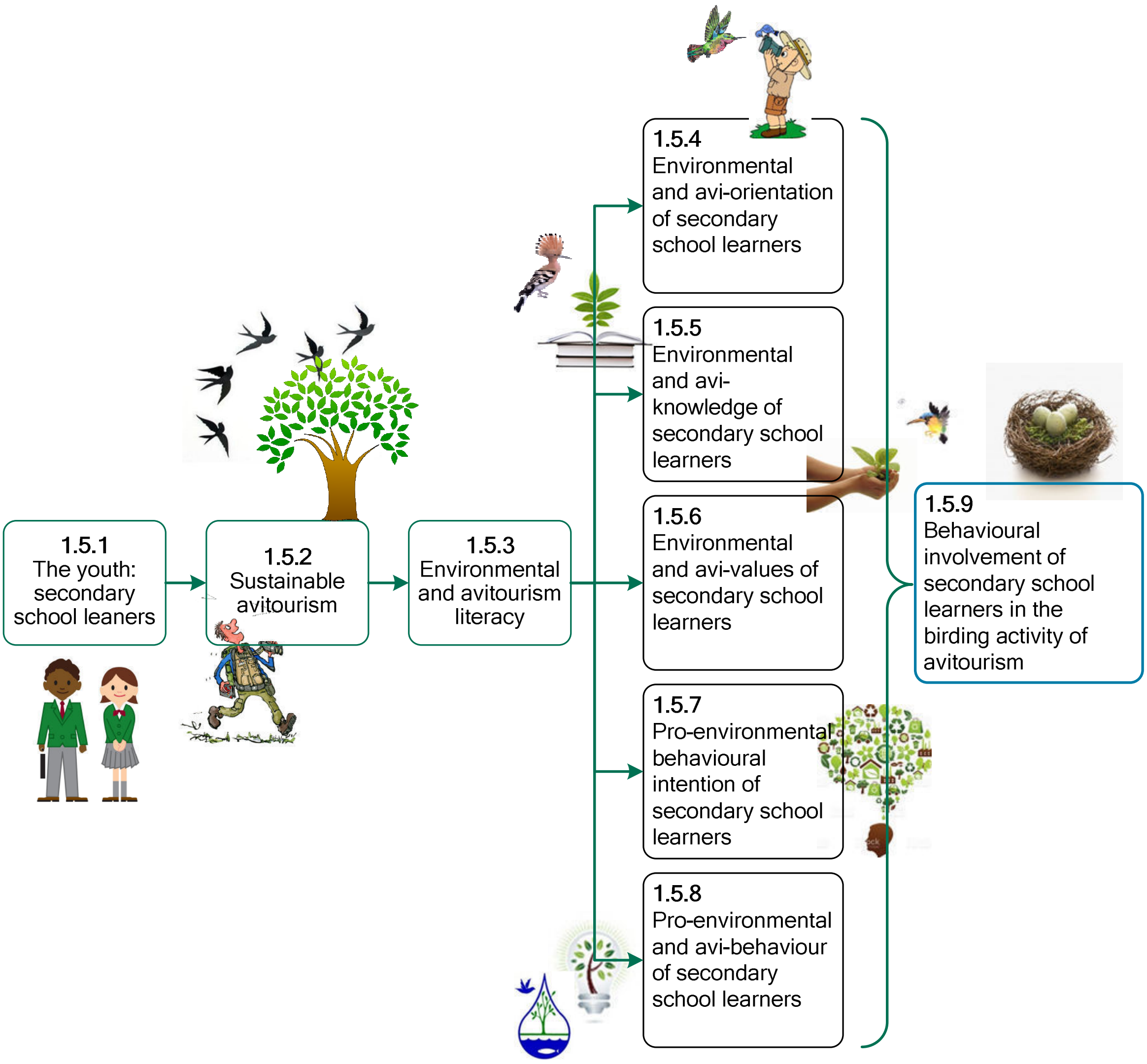


Figure 1.3: Key terms used in the thesis

The terms are presented consecutively, according to the flow diagram. For the purpose of this study, the key terms (e.g. environmental and avitourism literacy), was taken from the environmental education, environmental literacy and/or environmental psychology domains and was applied to the context of birds and the natural environment in which birds live. The interdisciplinary nature of this research therefore contributes to a lengthy introduction (Chapter 1).

1.5.1 The youth: secondary school learners

Educating the youth is the key to provide the foundation of action for an equitable and a sustainable world (UNEP, 2017).

In general, the term ‘youth’ is defined, according to the Oxford English Dictionary, as “the period between childhood and adult age”. The United Nations describe youth as “a period of transition from the dependence of childhood to adulthood’s independence” (UN, N.d.(a)). The UN Secretariat uses the terms youth and young people interchangeable to mean, for statistical purposes, those persons between the ages of 15 and 24 years of age, but also recognises that several UN entities, instruments and regional organisations have somewhat different definitions of youth.

Formal education of the youth in South Africa is governed by two national departments, namely the Department of Basic Education (DBE), which is responsible for primary and secondary schools, and the department of Higher Education and Training (DHET), responsible for tertiary education and vocational training. Since the target group (population) of the present study comprised secondary school learners, the terms ‘secondary school’ and ‘learner’, followed by ‘secondary school learner’ are used.

‘Secondary schools’ in South Africa refers to public or independent schools, which enrols learners in grades from grade eight to grade twelve (Republic of South Africa [RSA], 1996:5). According to the South African Schools Act, a learner means “any person receiving education or obliged to receive education”. A ‘learner’ is also defined as any person, ranging from early childhood development to the adult education phases, who is involved in any kind of formal or non-formal education and training activity, any person who receives, or is obliged to receive, education (Gasa, 2005:10; Mothata, Lemmer, Mda & Pretorius, 2000:94). A ‘secondary school learner’, refers to any person receiving education, or is obliged to receive education, and who is enrolled in grades raging from Grade 8 to Grade 12 (RSA, 1996:5).

According to the stages of development, the secondary school learner is in the adolescent stage (Gasa, 2005:10). The World Health Organisation (WHO) refers to adolescence as to a transitional phase of growth and development between childhood and adulthood (WHO, N.d.) while an adolescent as "any person between ages 10 and 19 years" (WHO, N.d.).

For the purpose of this study, a secondary school learner can:

- Be classified as part of the wider term 'youth' and 'young people'
- Attend a secondary school, governed by the Department of Basic Education in SA, ranging from Grade 8 to Grade 12
- Be a person who is receiving education, or who is obliged to receive education, and who is enrolled in grades raging from Grade 8 to Grade 12
- Be in the adolescent stage, ranging between 10–19 years old according to the stages of development.

For the present study, a secondary school learner refers to a person receiving education or obliged to receive education, who is enrolled in a secondary school in grades raging from grade 8 to grade 12 and are in the adolescent phase ranging 10–19 years old. Note that this study included learners in Grades 8–10. Their ages ranged from 13to17 years old.

The secondary school learner will have a major influence on the future state of the natural environment (including birds and bird habitats) on which sustainable avitourism depends.

1.5.2 Sustainable avitourism

Definitions of 'avitourism' given in the literature include birding and birdwatching. Birdwatching (birding), is a form of a recreational outdoor activity which involves searching for, observing, identifying, and enjoying birds in their native (natural) habitats (Cheung *et al.* 2017:817; Cobar *et al.*, 2017:18; Biggs, 2013:394; Biggs *et al.*, 2011:80; Eubanks 2010:56; Sekercioğlu, 2002:282). The birding activity refers to the observation and study of birds either with the naked eye or through visual enhancement equipment, such as binoculars, cameras, tripods, spotting scopes, as well as specialised audio equipment, in order to identify and/or capture images (bird photography) and sounds of birds (Cobar *et al.*, 2017:18; Istomina, Luzhkova & Khidekel, 2016:371; dti, 2010:5,13). Backyard birding or watching birds around the home is the most common form of birding, while birders who take trips away from home (i.e. away-from-home, non-residential birders or avitourists) participate in a more active form of birding (Kim *et al*., 2010:228).

Birdwatching, or birding activity, is referred to as 'avitourism' or 'birding tourism' if the birder takes a trip a mile (1.6 km) or more from home for the primary purpose of observing birds (La Rouche, 2003:4; Lindsay, n.d:1). Currently in SA, avitourism is defined in the National Avitourism Strategy (NDT, 2011a:10) as travel by birdwatchers, domestically and internationally, outside of a person's usual environment for the purpose of viewing birds in their natural habitats.

Avitourism, a niche tourism market, is centred on components of the natural environment, i.e. birds and their habitats, and is therefore a sub-category of nature-based tourism and wildlife-watching tourism (Biggs, 2013:394; *Centrum tot Bevordering van de Import uit Ontwikkelingslanden* [CBI], 2015:2; dti, 2010:12; Kim *et al*., 2010:228; Rogerson *et al*., 2013:122; Steven *et al*., 2015:1257). Avitourism is also classified as a component of ecotourism since it is expected to contribute to the goal of enhanced conservation of ecotourism (Chen & Chen 2015:416; Hvenegaard, 2002:21; Sekercioğlu, 2002:282).

Avitourism is a form of tourism that focuses on economic, social and environmental sustainability (Connell, 2009:215; Kronenberg, 2014:623; Ma *et al.*, 2013:295) and thus can be viewed as a form of sustainable tourism. Sustainable avitourism can be defined as avitourism that takes full account of its current and future economic, social and environmental impacts, addressing the needs of avitourists, the avitourism industry, the environment, and host communities (adapted from UNEP and UNWTO, 2005:11; UNWTO, 2017b).

In summary, 'sustainable avitourism' is mainly:

- A recreational, outdoor activity of searching for, observing, identifying, and enjoying birds in their native (natural) habitats
- An activity where the birder needs to take a trip away from home (travel outside of a person's usual environment) for the primary purpose of observing birds
- An activity that can be done by the naked eye or which requires specific equipment such as binoculars, cameras, tripods, spotting scopes, as well as

specialised audio equipment, in order to identify and/or capture images and sounds of birds

- A niche tourism market and component or sub-category of nature-based, eco- and wildlife-watching tourism that is focused specifically on birds and birdwatching as an activity
- A form of sustainable tourism since it is expected to contribute to economic, social and environmental sustainability
- Applies to both domestic and international avitourism
- Not backyard birding, watching birds around the home, simply noticing birds while mowing the lawn or picnicking at the beach, trips to zoos or observing captive birds
- Excludes bird-hunting tourism (i.e. wingshooting).

Based on the above, 'sustainable avitourism' refers to an activity of observing, identifying and enjoying birds in their native habitats where the birder needs to take a trip away from home for the primary purpose of observing birds. Furthermore, it is a niche tourism market (both domestic and international) and a component or sub-category of nature-based, eco- and wildlife-watching tourism that is focused specifically on birds and birdwatching as an activity. Sustainable avitourism also takes full account of its current and future economic, social and environmental influences, addressing the needs of avitourists, the avitourism industry, the environment, and host communities. Lastly, avitourism excludes bird hunting and backyard birding, where the birder merely watches birds around the home, noticing birds while mowing the lawn or picnicking at the beach, or through trips to zoos or the observation of captive birds.

For the purposes of this study, the terms 'birding' and 'birdwatching' will be used interchangeably. In this study, the term 'birding' refers to birding or birdwatching as an activity performed by avitourists. However, 'avitourism' refers to travel related to birdwatching.

Sustainable avitourism is however dependent upon the natural resource base, specifically birds and their native habitats, which is being placed under increasing pressure due to the cumulative effect of environmental influences, such as habitat destruction and degradation, habitat fragmentation, and pollution. Education has been earmarked as our best hope for solving these environmental problems. The present study identified ‘environmental and avitourism literacy’ (adapted from environmental education and environmental literacy domains) as an approach to improve the attitude and behaviour of secondary school learners towards birds and the natural environment over the long-term. The terms ‘environmental and avitourism literacy’ are discussed next.

1.5.3 Environmental and avitourism literacy

Although the terms environmental education and environmental literacy are sometimes used interchangeable in secondary literature, ‘environmental literacy’ is referred to as the intended outcome of the process and the fundamental goal of environmental education[8] (Elder, 2003:7; Erdoğan, 2009:37; Farber, 2015:17; Igbokwe, 2012:649).

Harvey (1977:67), in one of the early attempts to conceptualise environmental literacy, defined an environmentally literate person as “one who possesses basic skills, understandings, and feelings for the man-environment relationship”. According to Roth (1992:8), environmental literacy is the capacity to perceive and interpret the relative health of environmental systems and to take appropriate action to maintain, restore, or improve the health of those systems. Hsu (2004:38) expanded on Roth’s (1992) definition and refers to environmental literacy as “an individual’s knowledge about and attitudes toward the environment and environmental issues, skills and motivation to work toward the resolution of environmental problems, and active involvement in working toward the maintenance of dynamic equilibrium between the quality of life and quality of environment”.

Reflecting on the components of environmental literacy, Loubser, Swanepoel and Chacko (2001:318) define environmental literacy as “the ability to be aware of one’s environment. It enriches one with the knowledge to realise the imbalances and threats the environment faces and enables one to form positive attitudes towards it

[8] *Environmental education* is “the process through which children come to understand and appreciate the environment and their connection to it. It aims to develop the skills and willingness to make decisions and take action to sustain the environment” (Murdoch, 1993:3).

with the aim of developing skills to resolve and prevent environmental problems and urge to protect and improve the environment for the present and future generations by active participation" (Loubser *et al*., 2001:318–319).

Furthermore, environmental literacy is considered a continuum of competencies ranging from zero competency to very high competency. The broad spectrum of environmental literacy ranges from complete unawareness to a deep, thorough understanding and concern for the environment (Loubser *et al*., 2001:318–319).

For the purpose of this study, the term 'environmental literacy' was taken and applied to the context of birds and the natural environment in which birds live. In summary, 'environmental and avitourism literacy' refers mainly to:

- environmental literacy concerning birds, the natural habitats of birds and sustainable avitourism and birdwatching activities;
- the intended outcome related to the process of 'bird and environmental education';
- various components or elements, including knowledge, skills, affect (environmental sensitivity, attitudes and values) and behaviour (personal investment and responsibility, and active involvement);
- a continuum of competencies ranging from a complete unawareness to a deep thorough understanding and concern for the environment;
- awareness of birds and the natural environment in which birds live;
- knowledge of birds and the natural environment;
- positive attitudes and values towards birds and bird habitats;
- developing skills to resolve and prevent environmental problems affecting birds;
- behavioural intention towards birds and the natural environment (i.e. intended pro-environmental behaviour);
- protecting birds and improving the natural environment in which birds live for the present and future generations by active participation (i.e. actual pro-environmental behaviour towards birds and the environment); and
- learners becoming engaged in making the world more sustainable than it is currently.

For the purpose of this study, ‘environmental and avitourism literacy’ refers to an individual’s awareness and affinity, knowledge, values, behavioural intention and actual pro-environmental behaviour towards birds, the natural environment, and sustainable avitourism (or birdwatching), to protect birds and improve the natural habitat of birds in which birds live for the present and future generations.

The definition developed for ‘environmental and avitourism literacy’ reflects on five components of environmental and avitourism literacy, which were used to inform the present study. The definition not only provided a background and context for this study, but also assisted when considering how to operationalise or transform the concept into an instrument that would measure the underlying categories and components of environmental and avitourism literacy.

Since the present study focused specifically on birds and the natural environment in which birds live, the following five environmental and avitourism literacy components were included:

- environmental and avi-orientation (including awareness and affinity);
- environmental and avi-knowledge;
- environmental and avi-values;
- behavioural intentions; and
- pro-environmental and avi-behaviour.

Each of the ‘environmental and avitourism literacy’ components are explained next, starting with ‘environmental and avi-orientation’ of secondary school learners.

1.5.4 Environmental and avi-orientation of secondary school learners

Environmental orientation is explained as “children’s perceptions of nature” and the ways in which people “perceive the natural world” (Larson, Green & Castleberry, 2011:72). Two distinct components of environmental orientations was identified by Larson, Green & Castleberry (2011:72) namely eco-awareness and eco-affinity. Eco-affinity refers to a cognitive grasp of environmental issues related to the general importance and sustainability of natural ecosystems, while eco-awareness refer to personal interest in nature (Larson, Green & Castleberry, 2011:83). Together, these components represent environmental orientations, which encompassed elements of ecological appreciation and environmental concern (Eagles & Demare, 1999; Kellert, 2002; Larson, Green & Castleberry, 2011:72).

For the purpose of the present study, the term environmental orientation was taken and applied to the context of birds and the natural environment in which birds live. In summary, 'environmental and avi-orientation' refer to:

- ways in which learners perceive the natural world, more specifically birds and the natural environment in which birds live;
- avi-affinity and avi-awareness components, where avi-affinity refers to natural liking or attraction and personal interest in birds and the natural environment; while
- avi-awareness refers to a cognitive grasp of environmental issues related to the general importance and sustainability of birds in their natural ecosystems.

Based on the above, 'avi-awareness' reflects a general impression, or consciousness about the general importance and sustainability of birds and their natural habitat. In turn, 'avi-affinity' is defined as a natural inclination or attraction to something and reflects personal interest in birds and their natural habitat. These terms are collectively referred to as 'environmental and avi-orientation', which is defined as the way in which an individual perceive the natural world, reflected in the general impression, consciousness about the importance and personal interest in birds and the natural environment in which birds live.

Developing environmental and avi-knowledge requires more than a general awareness, consciousness and interest in the environment. It requires an understanding and comprehension of human and natural systems and processes (Elder, 2003:16). The second dimension of environmental and avitourism literacy, namely environmental and avi-knowledge of secondary school learners, is explained next.

1.5.5 Environmental and avi-knowledge of secondary school learners

Environmental knowledge is defined as "individuals' familiarity with facts, information and principles relating to environmental sustainability" (Ramsey & Rickson, 1976; Wiernik, Ones & Dilchert, 2013:831). According to Zsóka, Szerényi, Széchy and Kocsis

(2013:127), environmental knowledge is “knowledge and awareness about environmental problems and possible social solutions to those problems”. Haron, Paim and Yahaya (2005:427) define environmental knowledge as “one’s ability to understand and evaluate the impact of society on the eco-system”. Furthermore, environmental knowledge can be demonstrated through a person’s ability to recognise environmental problems, the causes and consequences of such problems, including facts and concepts necessary for explanation (Haron *et al*., 2005:427; Othman, Ong & Lim, 2004).

Based on the above, the term ‘environmental knowledge’ as applied to the context of this study, focusing on birds and the natural environment, ‘environmental and avi-knowledge’ of secondary school learners refers mainly to:

- Individuals’ familiarity with facts, information and principles relating to the sustainability of birds and the natural habitat in which birds live
- Knowledge and awareness about and causes of environmental problems that might affect birds and their natural habitats, and possible social solutions to those problems
- One’s ability to understand and evaluate the impact of society on the eco-system in which birds live.

For the purpose of this study, the definition of ‘environmental and avi-knowledge’ was formulated from the above definitions, and is therefore ‘an individual’s knowledge and ability to understand and evaluate the facts, information and principles relating to the sustainability of birds and the natural habitats in which birds live, the causes of environmental problems affecting birds and bird habitats, and possible social solutions to these environmental problems’.

According to Bögeholz (2006:80), sustainable development does not only require competencies based on environmental knowledge, but also competencies regarding environmental values. In particular, greater self-awareness of personal value systems and a willingness to revise them is required to prepare secondary school learners for a sustainable lifestyle (Sibbel, 2009:79). Environmental and avi-values of secondary school learners are discussed next.

1.5.6 Environmental and avi-values of secondary school learners

Rokeach (1968:159) originally defined values as "centrally held and enduring beliefs that guide actions and judgements across specific situations and beyond immediate goals to more ultimate end-states of existence". Furthermore, Schwartz and Bilsky (1987) and Schwartz (1992) have advanced the understanding of values in the field of social psychology. Based on earlier studies of human values and wide cross-cultural studies, Schwartz (1992) defined a value as "a desirable trans-situational (relatively stable, manifesting itself in different situations) goal varying in importance, which serves as a guiding principle in the life of a person or other social entity." Values are also defined as "deeply rooted, abstract motivations that guide, justify or explain attitudes, norms, opinions and actions" (Davidov, Schmidt & Schwartz, 2008:421; Schwartz, 1992). According to Wiernik, Ones and Dilchert (2013:830), 'environmental values' is "the priority the natural environment is assigned in making choices, justifying actions, and evaluating events and people" (based on Schwartz, 1992).

Although basic human values are presented as deeply rooted motivations that guide personal attitudes, the difference between 'value' and 'attitude' has remained unclear, and according to the Davidov *et al.* (2008:2) survey, researchers seldom distinguish between values and attitudes. Attitudes can be understood to be the reflection of basic human values (Davidov *et al*., 2008:2).

In general, attitude is defined as a psychological tendency that is expressed by evaluating a particular entity with some degree of favour or disfavour (Milfont, 2007). A more recent definition of environmental attitude is provided by Schultz, Gouveia, Cameron, Schmuck and Franëk (2005:458) as a "collection of beliefs, affect, and behavioural intentions a person holds regarding environmentally related activities or issues". Attitudes toward environmental behaviours are a rational evaluation of the perceived positive and negative consequences of performing a particular environmental behaviour (Wiernik *et al*., 2013:833; Bamberg and Möser, 2007). According to Wiernik *et al*. (2013:833), the sum of these perceived consequences determines the overall attitude toward the behaviour.

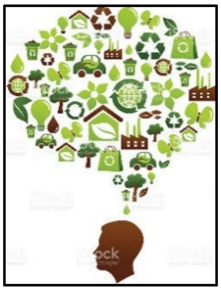
In summary, secondary school learners' 'values and attitudes' regarding birds and the environment mainly refers to:

- personal values to be desirable goals varying in importance and serving as guiding principles in one's life;
- deeply rooted, abstract motivations that guide, justify or explain attitudes, norms, opinions and actions regarding birds and bird habitats;
- attitudes towards birds and the natural environment can be understood to be the reflection of basic human values;
- an attitude is reffered to as a psychological tendency that is expressed by evaluating a particular entity (for example, birds) with some degree of favour or disfavour;
- environmental attitudes is a collection of beliefs, affect, and behavioural intentions a person holds regarding environmentally related activities or issues; and
- attitudes toward environmental behaviours influencing birds and the natural habitats of birds, is a rational evaluation of the perceived positive and negative consequences of performing a particular environmental behaviour.

The definition of 'environmental and avi-values' of secondary school learners, were adapted from the definitions provided in the above literature (Davidov *et al*., 2008:2; Rokeach, 1973; Schwartz, 1992). For the purpose of the present study 'environmental and avi-values' is defined as: 'Deeply rooted, abstract motivations that guide, justify or explain attitudes, norms, opinions and actions regarding birds and bird habitats'.

The learner's intention to act in an environmentally friendly manner is reflective acting according to emotions and feelings. 'Pro-environmental behavioural intention' of secondary school learners towards birds and the natural environment is therefore discussed next.

1.5.7 Pro-environmental behavioural intention of secondary school learners



Various terms, definitions or descriptions for 'pro-environmental behavioural intentions', were reported in secondary literature. The terms 'behavioural intention', 'intention to act' and 'verbal commitment' are used interchangeably.

Behavioural intentions are defined as "a person's perceived likelihood or subjective probability that he or she will engage in a given behaviour" (Institute of Medicine, 2002:1). Ajzen (1991:181) argues that behavioural intentions reflect how hard a person is willing to try, and how motivated he or she is, to perform the behaviour. Furthermore, behavioural intention provides an indication of how much effort individuals are planning to exert in order to perform a particular pro-environmental behaviour (Ajzen, 1991:181; Bamberg & Möser, 2007:15). According to more recent research by Wiernik *et al*. (2013:843) behavioural intentions refer to a person "affirming that one intends to perform an environmentally sustainable behaviour in the future".

Behavioural intentions are also referred to by the person's verbal commitment towards environmental topics. According to Maloney and Ward (1973:584) verbal commitment measures what a person states he/she is willing to do in reference to environment-pollution issues. Furthermore, verbal commitment refers to an expressed intention to act in a specific manner, for example, regarding an environmental problem (Hines, Hungerford & Tomera, 1987:5).

In summary, the 'pro-environmental behavioural intentions' of learners towards birds, bird habitats and avitourism refer to:

- A learner's perceived likelihood or subjective probability that he or she will engage in actual pro-avi- and pro-environmental behaviour
- How hard a learner is willing to try, and how motivated he or she is, to perform the behaviour
- An indication of how much effort individuals are planning to exert in order to perform a particular pro-environmental behaviour
- Affirming that one intends to perform an environmentally sustainable behaviour in the future

- The person’s verbal commitment towards environmental topics
- An expressed intention to act in a specific manner, for example, an environmental problem.

For the purposes of this study, behavioural intention towards birds and the natural environment in which birds live and avitourism and are defined as: ’A learner’s perceived likelihood or subjective probability that he or she will engage in actual pro-avi- and pro-environmental behaviour, how hard a learner is willing to try or how much effort the learners are planning to exert to perform a particular pro-environmental behaviour, and also the learner’s affirmation or verbal commitment that they intend to perform environmentally sustainable behaviour towards birds and bird habitats in the future”.

While ‘pro-environmental behavioural intentions’ denotes the learners’ affirmation or verbal commitment that they intend to perform environmentally sustainable behaviour towards birds and bird habitats in the future, it is increasingly recognised that pro-environmental actions (actual commitment) are essential for decreasing environmental problems and to promote sustainable lifestyles (De Groot & Steg, 2010:368). Therefore, the question of ’what do people actually do on a day-to-day, personal level to protect and care for the environment” is the type of behaviour that is referred to as ‘pro-environmental behaviour’ (De Groot & Steg, 2010:368).

1.5.8 Pro-environmental and avi-behaviour of secondary school learners

Pro-environmental behaviour is described as “an attempt to influence the individual’s behaviour to act in a more environmentally friendly or environmentally sustainable manner” (Osbaldiston & Schott, 2012:258). These behaviours are called pro-environmental behaviours, though various terms (e.g. environmental responsible behaviours, environmentally significant behaviours, environmentally responsible behaviours, and actual commitment to pro-environmental behaviour), were used interchangeable in secondary literature.

According to Eilam and Trop (2012:2212) the term environmental behaviour was referred to as “any active responsiveness to current environmental issues, believed to be pro-environmental by the person performing the response”. Pro-environmental behaviour can be defined as the action of an individual or group that advocates the sustainable or diminished use of natural resources (Sivek & Hungerford 1990; 1990; Osbaldiston & Schott, 2012). Furthermore, pro-environmental behaviours are viewed as a mixture of self-interest (e.g. to pursue a strategy that minimises one's own health risk) and of concern for other people, the next generation, other species or whole eco-systems (e.g. preventing air pollution that may cause risks for the health of others or the global climate) (Bamberg & Möser, 2007).

According to Yeung (1998:252) environmentally responsible behaviour therefore includes the action dimension of environmental consciousness.[9]

Furthermore, according to Erdoğan, Kostova and Marcinkowski (2009:17) environmental responsible behaviours include active and considered participation aimed at solving environmental problems and resolving environmental issues.

Stern (2000:408) defined environmentally significant behaviour from two perspectives, namely an impact-oriented, and an intent-oriented definition. From the impact perspective, environmentally significant behaviour was defined as "the extent to which it changes the availability of materials or energy from the environment or alters the structure and dynamics of ecosystems or the biosphere itself". Environmentally significant behaviour can also be defined from an intent perspective, as environmental protection has become an important consideration in human decision-making. Therefore it can now be defined from the actor's standpoint as "behaviour that is undertaken with the intention to change (normally, to benefit) the environment" (Stern, 2000:408).

Following Stern (2000), De Groot and Steg (2010:368; 2009:1) and Steg and Vlek (2009:309) define pro-environmental behaviours as "those behaviours that change the availability of materials or energy from the environment or alter the structure and dynamics of ecosystems or the biosphere positively." Pro-environmental behaviour refers to behaviour that harms the environment as little as possible, or even benefits the environment (Steg & Vlek, 2009:309). Acting pro-environmentally entails that

[9] *Environmental consciousness* is a measure of a person's ability to understand the nature of environmental processes and problems, her or his degree of concern for environmental quality and the extent to which he or she is committed to positive environmental behaviour in everyday life (Yeung, 1998:252).

people benefit others or the environment, whereas often no direct individual benefits are received by engaging in these behaviours. For example, reducing car use is beneficial for society and the environment because it reduces environmental pollution, extensive land use, and congestion. However, reducing car use has individual disadvantages, such as decreased freedom or increased travel times (De Groot & Steg, 2009:1). Pro-environmental behaviour often implies acting in the morally right way, that is, acting on considerations of what is the right or wrong thing to do (Thøgersen, 1996). Pro-environmental behaviour often does not benefit individual interests in the short term, but mainly benefits other people or the environment (De Groot & Steg, 2009:1; Thøgersen, 1996).

According to Mobley, Vagias and DeWard (2010) environmentally responsible behaviours occur when an individual or group aims "to do what is right to help protect the environment in general daily practice" (Cottrell, 2003:356). Monroe's (2003:115) conceptualisation of environmentally responsible behaviours as "a general approach to seeking information, making decisions, and valuing a stewardship ethic", is thus a reflection of responsible citizenship (Hungerford & Volk, 1990).

Following Mobley *et al*. (2010) and Iwata (2001) Chiu, Lee and Chen (2014:879) define environmentally responsible behaviour as "a characteristic of individuals who are knowledgeable and concerned about the environment and will therefore engage in a behaviour that would avoid damage to the environment".

According to Haron *et al*. (2005:427) environmentally responsible consumer behaviour relates to consumption activities that benefit, or cause less harm to the environment than substitutable activities. Hence, consistent with the focus of sustainable consumption, which is concerned with the economic activity of choosing, using and disposing goods and services and how this can be changed to bring social and environmental benefits, consumers can behave in a more environmentally friendly way by changing the patterns they use to acquire, utilise and dispose of goods or products (Haron *et al*., 2005:427).

Furthermore, the term responsible environmental behaviour refers to "the variety of recognised approaches to environmental action available to individuals or groups for use in preventing or resolving environmental problems or issues" (Hsu & Roth, 1998:232; Marcinkowski, 1988; Peyton, 1977).

In summary, the 'pro-environmental and avi-behaviour' of secondary school learners refers to:

- the action dimension of environmental consciousness and/or environmental and avitourism literacy;
- an attempt to influence the learner's behaviour to act in an environmentally friendly or environmentally sustainable manner to protect birds and bird habitats;
- active responsiveness to current environmental issues (influencing birds and bird habitats) believed to be pro-environmental by the person performing the response;
- active and considered participation aimed at solving environmental problems and resolving environmental issues influencing birds and bird habitats;
- the variety of recognised approaches to environmental action available to individuals or groups for use in preventing or resolving environmental problems or issues;
- the action of an individual or group who advocates the sustainable or diminished use of natural resources, including birds and bird habitats;
- a mixture of self-interest (e.g. to pursue a strategy that minimises one's own health risk) and of concern for other people, the next generation, other species (e.g. bird species) or whole eco-systems (e.g. preventing air pollution that may cause risks for the health of others or global climate influencing birds and bird habitats);
- behaviours that change the availability of materials or energy from the environment or alters the structure and dynamics of ecosystems or the biosphere positively;
- consumption activities that benefit or cause less harm to the environment than substitutable activities, hence, consistent with the focus of sustainable consumption;
- behaviour that harms the environment as little as possible, or even benefits the natural environment in which birds live;

- behaviour that implies acting in the morally right way, that is, acting on considerations of what is the right or wrong thing to do, to do what is right to help protect the environment in general daily practice;
- a general approach to seek information, make decisions, and value a stewardship ethic; and
- a characteristic of individuals who are knowledgeable and concerned about the environment and will therefore engage in behaviours that would avoid damage to the environment.

In the present study, pro-environmental behaviour regarding birds, the natural environment in which birds live, and avitourism refers to: Behaviour that consciously seeks to minimise the negative impact of learner's actions on the natural and built world (for example, minimise resource and energy consumption that will support the existence of birds, reduce waste production to protect and save birds).

Although not described as a component of environmental literacy (as the previous five components used to inform this study), secondary school learners' 'behaviour involvement' in the birding activity and avitourism, was also investigated in the study. Environment-related experiences, for example a birding tour, was found to have a positive effect on knowledge, attitudes and a predisposition to action or responsible environmental behaviour (Hart & Nolan, 1999:7) therefore could ultimately contribute to the sustainability of birds and the environment.

1.5.9 Behavioural involvement of secondary school learners in the birding activity or avitourism

In general 'involvement' refers to the level of perceived personal importance and/or interest evoked by a stimulus (or stimuli) within a specific situation (Kotler & Keller, 2009:214; Antil, 1984:204). Havitz and Dimanche (1990:184) define involvement in a tourism setting as "a psychological state of motivation, arousal or interest between an individual and tourism destination, at one point of time characterised by the perception of the following elements: importance, pleasure, value, sign, risk consequence and risk probability". Bloch (in Antil, 1984:204) adds that involvement is "an unobservable state reflecting the amount of interest, arousal or emotional attachment evoked by the product in a particular individual". These emotional responses could create a deep commitment to the product or activity, which refers to a high level of consumer involvement (Solomon, Barmossy & Askegaard, 2002:93). A person's degree of involvement can be conceived as a continuum, ranging from absolute lack of interest at the one end to obsession at the other (Solomon *et al*. 2002:104). According to Kim *et al*. (1997:322), several leisure researchers measured involvement in behavioural terms. Stone (in Kim *et al*., 1997:321) defines behavioural involvement as "time and/or intensity of effort expended in pursuing a particular activity".

In summary, 'behavioural involvement in birding and avitourism' refers to:

- The level of perceived personal importance and/or interest evoked by a stimulus (or stimuli) within a specific situation, in this case birds and the natural environment
- A psychological state of motivation, arousal or interest in birds and the natural environment
- The perception of elements such as importance, pleasure, value, sign, risk consequence and risk probability of participating in the birding activity or avitourism
- The amount of interest, arousal or emotional attachment evoked in a particular individual (in this case, secondary school learners) that could create a deep commitment to the product or activity, in this case, birding activities and/or avitourism.
- The person's degree of involvement in birding activities or avitourism, which can be conceived as a continuum ranging from high to low
- The time and/or intensity of effort expended in pursuing birding activities or avitourism.

Based on the above, behavioural involvement in birding and avitourism is defined as the level of perceived personal importance, interest and emotional attachment evoked by birds and the natural environment that could create a deep commitment to the birding activity, which can be conceived as a continuum ranging from high to low.

Determining the level of secondary school learners' involvement (low/high) in birding activity is useful for the examination and prediction of the learners' behaviour towards birds and the natural environment (Decrop, 2006:10; McGehee, Yoon & Cárdenas, 2003:308).

The organisation of the thesis is outlined next.

1.6 ORGANISATION OF THE THESIS

This is the structure of the chapters in this thesis.

In Chapter 1, the background and orientation is provided by introducing tourism, sustainable tourism, and avitourism. Since sustainable avitourism is dependent upon the natural resource base, specifically birds and their native habitats, it was argued that 'environmental and avitourism literacy' of young people, more specifically secondary school learners, will set a sound basis for sustainable avitourism being regarded as a key potential growth area of tourism in South Africa. To realise the potential of avitourism in South Africa now and in the future, the protection and conservation of birds and their natural habitats is imperative. The development of sustainable avitourism, based on environmental and avitourism-literate young people, is likewise anticipated to improve the economic, social and environmental sustainability of SA. Against this background the problem statement, the aim and the research objectives of the study was discussed. The research method was discussed according to primary and secondary research conducted in the thesis. Relevant definitions of terms that are frequently used in the thesis were explained. These important points of departure set the context for the thesis.

The literature review is discussed in Chapters 2 and 3. Chapter 2 contains the first part of the literature study (*phase 1* of the methodological procedure), conceptualising 'sustainable avitourism', and 'environmental and avitourism literacy' to provide the context of the study.

The second part of the literature study (*phase 2* of the methodological procedure) is discussed in Chapter 3. The 'conceptual literacy framework for sustainable avitourism' that was developed for the present study is presented and explained. A detailed discussion of the five 'environmental and avitourism literacy' components included in the conceptual literacy framework, namely environmental and avi-orientation (including awareness and affinity), environmental and avi-knowledge, environmental and avi-values, behavioural intention, and pro-environmental and avi-behaviour are then provided. The behavioural involvement of secondary school learners in the birding or avitourism activity is also discussed.

The research method used in the thesis is discussed in Chapter 4, which follows the procedure (steps) of the primary research process. Details of the research design, sampling plan, research instrument, pilot test, data collection, data processing and methods used for the analysis of data are provided.

Chapter 5 reports and interprets the results and the analysis of respondents, namely Grade 8–10, secondary school learners in Gauteng. A discussion of the descriptive statistics and the factor analysis results are reported.

In Chapter 6, a stepwise process was followed to develop a ‘literacy model for sustainable avitourism’, with the assistance of the statistical technique SEM.

Lastly, Chapter 7 concludes and presents recommendations for the Gauteng Department of Education, secondary schools in Gauteng, BLSA, and managers involved in avitourism. The main conclusions from the literature review are presented followed by the conclusions and recommendations emanating from the descriptive and factor analysis results. Based on the SEM results, a literacy model for sustainable avitourism is proposed. Limitations of the study and recommendations for future research are also provided. The contributions of the research will also be highlighted.

Figure 1.4 shows the chapter outline of the thesis.

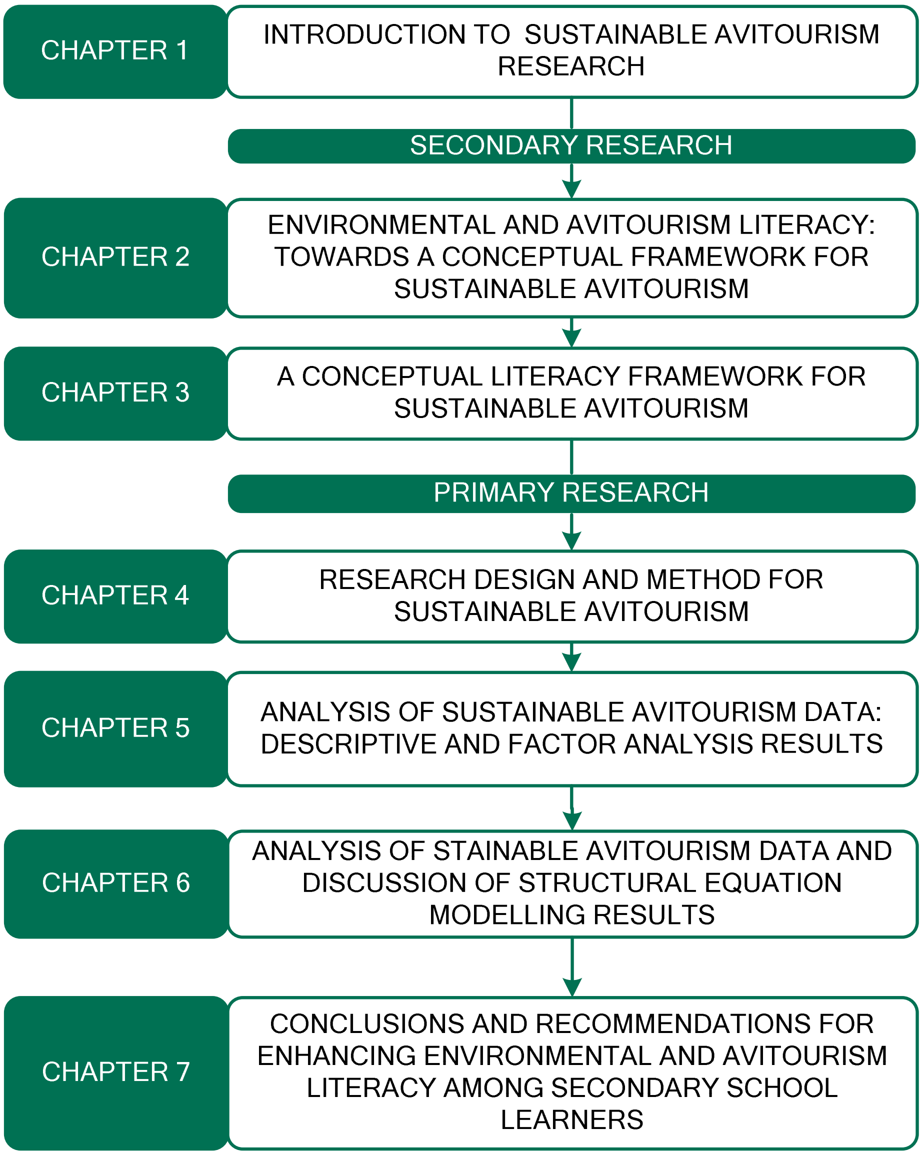


Figure 1.4: Chapter outline of the thesis

CHAPTER 2: ENVIRONMENTAL AND AVITOURISM LITERACY: TOWARDS A CONCEPTUAL FRAMEWORK FOR SUSTAINABLE AVITOURISM

2.1 INTRODUCTION

Avitourism, an important niche market in tourism, has been identified as a growth area and a trend in tourism (Chen & Chen, 2015:416; Cordell & Super, 2000:135; Sekercioğlu, 2002:282; Wheeler, 2008:208). The success and sustainability of avitourism is, however, dependent upon the natural resource base, namely birds and their natural habitat. That is being placed under increasing pressure. Consequently, to realise the potential of avitourism now and in the future, the protection and conservation of birds and their natural habitat is imperative and falls within the 2030 Agenda for Sustainable Development and the 17 Sustainable Development Goals (SDGs) (UNWTO, 2017a).

The world today is characterised by pervasive consumerism, and people have formed habits and social practices that are resource-intensive and which involve negative influences on the natural environment. These influences include habitat destruction and degradation, habitat fragmentation and pollution (De Beer *et al*., 2017:3; Van As *et al*., 2012:409,412). Although habits and behaviours of society are not easy to change, social systems need to be changed through the encouragement of positive alternatives to high-carbon lives (Urry, 2011:122). Which changes and initiatives are therefore required to ensure that avitourism is fundamentally more sustainable than it is currently?

To respond to the sustainability crisis, education has been earmarked as “our best hope for solving our current environmental problems” (Saylan & Blumstein, 2011:157; Urry, 2011:132; Van As *et al*., 2012:412; Wheeler, 2012:123). Accordingly, there is a need to improve our “social ecology”, which involves changes in values, mind-sets and behaviours towards the natural environment (Wheeler, 2012:123). The research on which this study is based, investigated environmental education strategies to progress towards the sustainability of birds, the natural environment and ultimately sustainable avitourism.

Chapter 2 represents *phase 1* of the methodological procedure (see Figure 1.2), which is the first part of the secondary research, namely the literature review. Both environmental education and the environmental literacy domains were explored to reach the first secondary objective, namely:

> To explore mechanisms and approaches aimed at facilitating behavioural change among secondary school learners towards birds and the natural environment.

Environmental literacy was identified as an approach to promote pro-environmentalism over the long term and to improve the attitudes and behaviours of secondary school learners towards the environment.

In Chapter 2, tourism, sustainable avitourism, and 'environmental and avitourism literacy' are introduced, linking these concepts to the first part of the second secondary objective, namely

> To conceptualise 'sustainable avitourism' and 'environmental and avitourism literacy' from existing literature.

Furthermore, with the literature review in Chapter 2, the researcher aims to work towards the development of a conceptual framework for sustainable avitourism. Based on the categories and components identified in the literature review presented in this chapter, a conceptual literacy framework for the present study, focusing specifically on birds, the natural environment and avitourism will be developed. In Chapter 3, the researcher follows up with the presentation (see Figure 3.1) and a detailed discussion of '*the conceptual literacy framework for sustainable avitourism*' developed for the present study. Figure 2.1 illustrates the flow of the secondary research presented in Chapters 2 and 3.

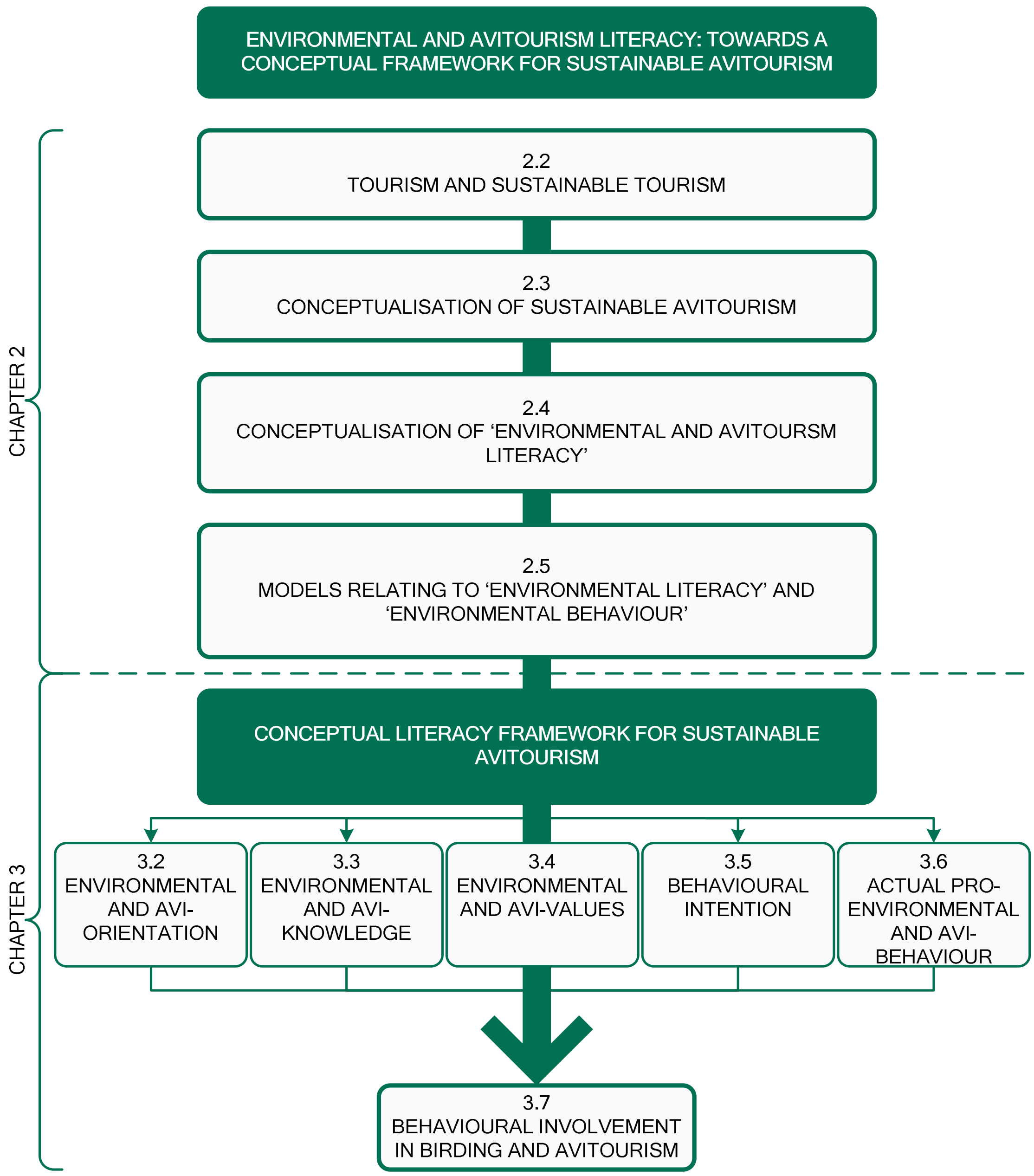


Figure 2.1: Flow of the secondary research (Chapters 2 and 3)

Figure 2.1 shows the structure of the literature review presented in Chapters 2 and 3. Each aspect is discussed in the sections that follow, as indicated in the figure. The growth and global significance of tourism, and the importance of sustainable tourism are discussed in the next section.

2.2 TOURISM, SUSTAINABLE TOURISM AND AVITOURISM IN CONTEXT

'Tourism' may be defined as "the process, activities, and outcomes arising from the relationships and the interactions among tourists, tourism suppliers, host governments, host communities, and surrounding environments, that are involved in the attracting and hosting of visitors" (Goeldner & Ritchie, 2012:6; Page, 2013:11). The officially accepted definition of the UNWTO is "Tourism comprises the activities of persons travelling to and staying in places outside their usual environment for not more than one consecutive year for leisure, business, and other purposes" (Cooper, 2012:14; Hermann, Du Plessis, Du Plessis, Kokt, Van Aardt & Menzies, 2016). The economic importance of the movement of people and the rapid growth of this sector indicate that tourism is of global and local significance (George, 2007:7; Goeldner & Ritchie, 2012:33).

One of the key trends in tourism demand is that tourism will continue to grow globally, as outlined in the Tourism Towards 2030 global overview of the UNWTO (UNWTO, 2011:12). The actual growth of international tourist arrivals for the period 1950–2016, and the projected growth to 2030 are shown in Figure 2.2.

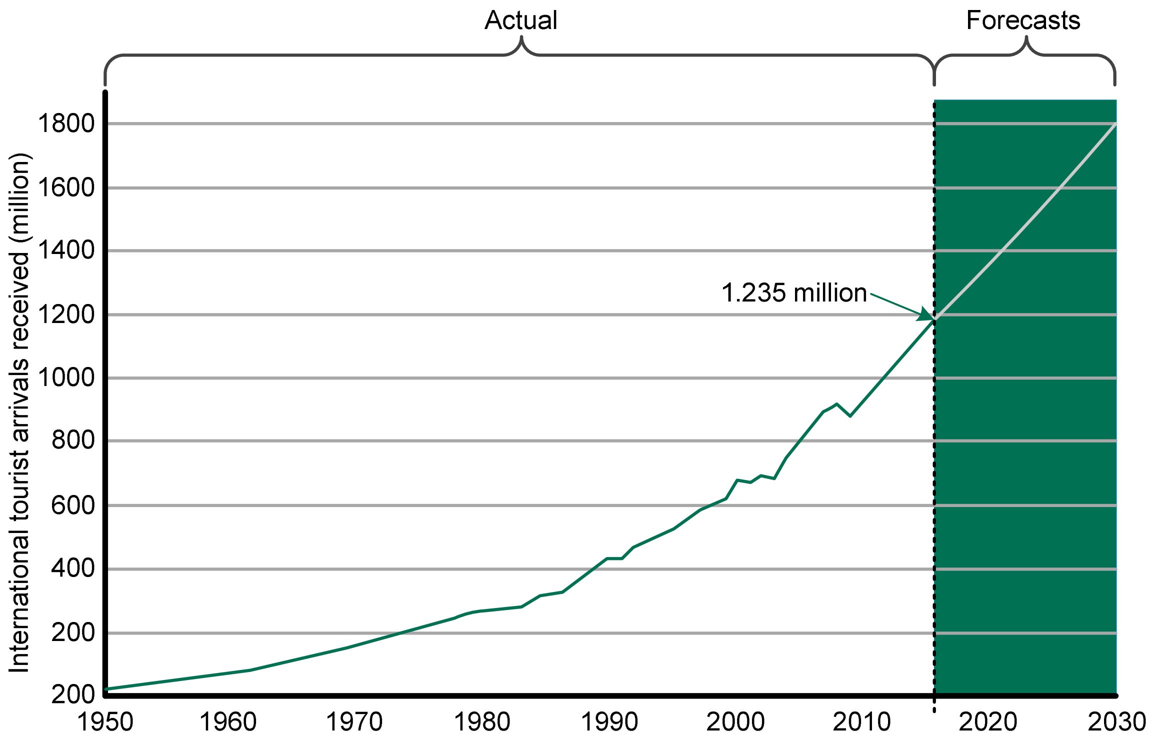


Figure 2.2: International tourist arrivals, 1950–2030

Source: UNWTO (2011:12); UNWTO (2016:14); UNWTO (2017b:3)

The recorded number of international tourist arrivals in 1950 was 25 million. This had risen to 687 million in 2000, and reached 1.235 million by 2016 (Holden, 2008:20; UNWTO, 2016:14; UNWTO, 2017a:11;). International tourist arrivals are projected to reach 1.8 billion by 2030, according to the UNWTO long-term forecast, Tourism Towards 2030 (UNWTO, 2011:15; UNWTO, 2016:14). It is evident from Figure 2.2 that the actual growth of international tourist arrivals since 1950 is highly significant, while the projected growth to 2030 indicate that there is still a great potential for further expansion, globally, in the coming decade.

However, can the planet sustain this growth? Is the current practice of tourism suitable to pass down to future generations as a model of economic development that will guarantee a source of income, without the destruction of the environment from which the income is generated? (Mowforth & Munt, 2009:94). The continued growth of the tourism industry has therefore resulted in the need to move towards '*sustainable tourism*' in all its dimensions (UNWTO, 2017a). "In parallel with the growth of the sector, there is also increased responsibility to advance towards greater sustainability, equity, inclusiveness and peace in our societies" (UNWTO, 2017a).

The concept of sustainability has a long developmental history, dating back to the 1960s, reflecting shifting priorities in society (Page & Connell, 2014:320). However, there remains confusion and a lack of agreement on the conceptualisation and definition of sustainability, sustainable development and sustainable tourism. Indeed, the terms has led to much controversy and debate in terms of scientific concepts, philosophy and practical application (Cooper, 2012:123). The most widely accepted definition of sustainable development, cited from the Brundtland report (World Commission on Environment and Development [WCED], 1987:8), is "*Development that meets the needs of the present without compromising the ability of future generations to meet their own needs*."

Although the debate continues on what sustainable tourism encompasses, the UNWTO developed a conceptual definition that can be shortened to "Tourism that takes full account of its current and future economic, social and environmental impacts, addressing the needs of visitors, the industry, the environment, and host communities" (UNEP and UNWTO, 2005:11).

Originally, the concept 'sustainable tourism' emerged as a counterpoint to what is commonly referred to as 'mass tourism' (Holden, 2008:232). 'Old' tourism is characterised by mass, standardised and rigidly packaged offerings, while 'new' tourism (also called 'alternative tourism') is characterised by environmental consciousness, and new forms of tourism (Holden, 2008:231; Page, 2013:193; Page & Connell, 2014:55; Poon, 2003:130). Therefore, besides the growth in environmental consciousness, the development of alternative forms of tourism can also be associated with the over-familiarity of mass-tourism amongst consumers, and a subsequent desire for new types of holidays (Holden, 2008:232; Novelli, 2005:1; Page, 2013:193;). This resulted in various niche tourism markets (Rogerson, 2011:199).

However, according to the seminal work of Clarke (1997) (in Page & Connell (2014:324), who classified approaches to sustainable tourism into four positions, from the early ideas of the polar opposite to mass tourism (as explained above), moving to 'convergence', which is the contemporary viewpoint, and which is also supported by the UNWTO (UNESCO, 2017; Page & Connell, 2014:324; Cooper, 2012:126). The convergence position implies that sustainable tourism is not the exclusive concern of new forms of tourism. Tourism activities with whatever motivation, be it holidays, business travel, conferences, adventure travel or ecotourism, including mass tourism, need to be sustainable (Cooper, 2012:126; Page & Connell, 2014:324; UNESCO, 2017). Figure 2.3 illustrates the phenomenon of mass tourism versus alternative forms of tourism, where the latter includes 'avitourism', which was the focus of the present study. The purpose of Figure 2.3 is to contextualise avitourism in the broader framework of tourism, more specifically sustainable avitourism. Each part of the figure is explained, starting from the left side of the figure, and moving to the right end of the figure.

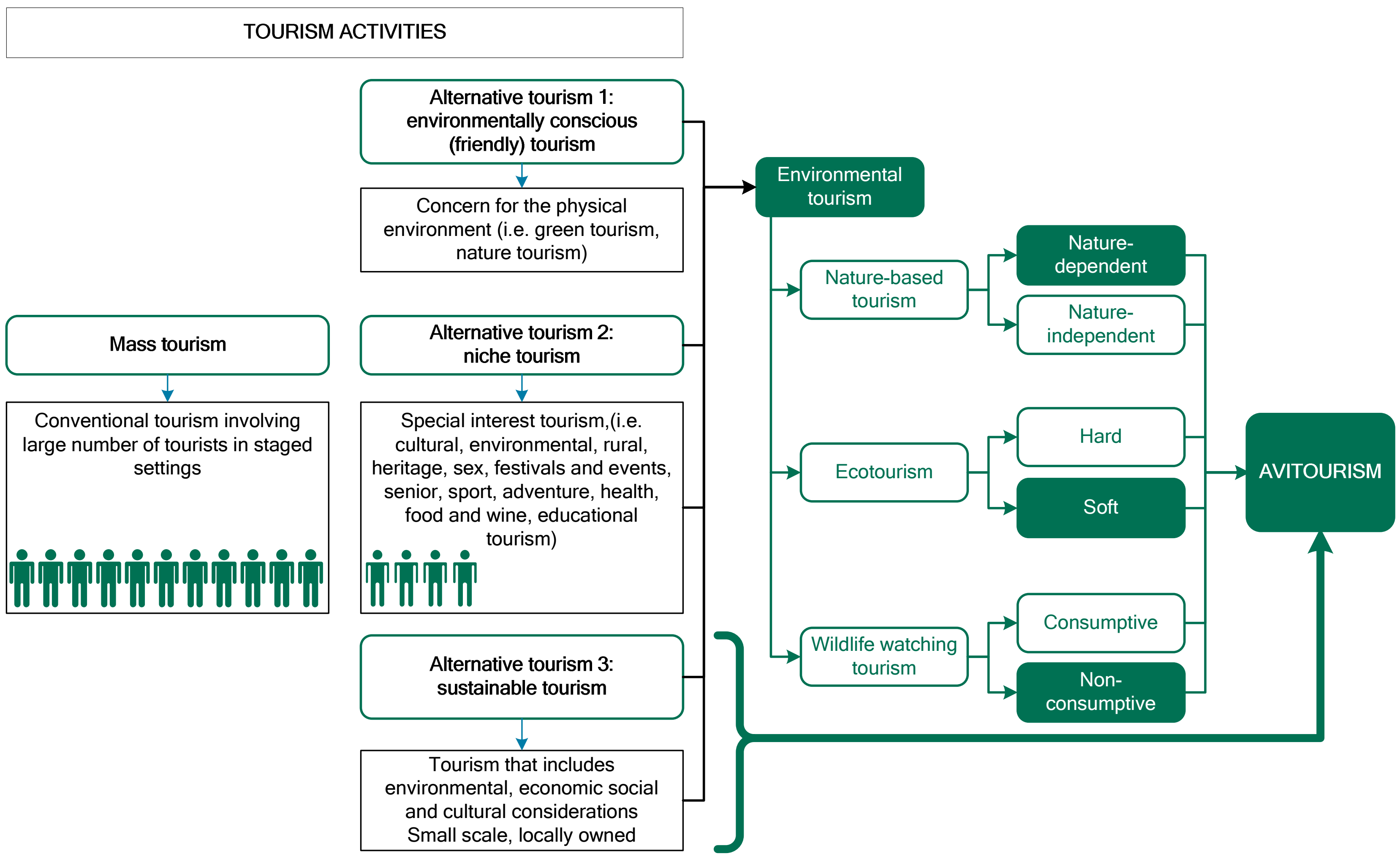


Figure 2.3: Mass tourism versus alternative forms of tourism

Source: Adapted from Newsome (2017:2); Biggs (2013:394); Fennell (2008:107); Holden (2008:232); Newsome, Dowling and Moore (2005:6); Novelli (2005:9); Trauer (2006:188); Van Zyl (2005:5); Sekercioğlu (2002:282): Dowling (2001:294); Cater (1993:85); Valentine (1992:110)

As is evident from the left side of Figure 2.3, the concept of alternative tourism (as opposed to mass tourism) can be interpreted in three different ways (Rogerson, 2011:199; Connell, 2009:203; Holden, 2008:232; Cater, 1993:85):

1. a form of more environmentally conscious/friendly tourism (i.e. green tourism or nature tourism);
2. types of tourism that are different to mainstream tourism (i.e. niche tourism[10] or special interest tourism[11]) without necessarily being any less environmentally damaging; and
3. characterised by activities that are likely to be on a small scale, offered by locally owned enterprises, with minimum negative environmental and social impacts or leakages[12] and a high proportion of profits retained locally.

The characteristics in the latter description (alternative tourism 3) contrast with large-scale multinational concerns typified by high leakages, which characterise mass tourism (Holden, 2008:232). Using these criteria, alternative tourism 3, surpasses a concern for the physical environment only, which typifies green tourism. Alternative tourism 3 includes economic, social and cultural considerations (Holden, 2008:232). Accordingly, alternative tourism 3 can be viewed as synonymous with the concept of sustainable tourism (Holden, 2008:232).

Moving to the right side of Figure 2.3, 'environmental tourism', which is one form of alternative tourism, could also be interpreted as environmentally friendly tourism, or alternative tourism 1. Environmentally friendly tourism is classified as a type of special interest tourism (alternative tourism 2). Environmentally friendly tourism

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[10] The term 'niche tourism' is borrowed and adapted from the term 'niche marketing', which refers to a specific product tailored to meet the needs of a particular audience or market segment. A 'niche market' is a narrowly defined group in which the individuals in the group are identifiable by the same specialised needs or interest and are defined as having a strong desire for the products on offer (Rogerson, 2011:199; Novelli, 2005:5).

[11] Special interest tourism is defined as "the provision of customised leisure and recreational experiences driven by the specific expressed interests of individuals and groups" (Derrett, 2001:3).

[12] Leakages are referred to as "The retention of the majority of the economic expenditure from tourism by local people" (Holden, 2008:232).

should also be practiced in a sustainable manner (alternative tourism 3). Furthermore, 'environmental tourism' consists of nature-based tourism, ecotourism and wildlife-watching tourism (Conradie, 2010:32; Dowling, 2001:289; Newsome, 2017:2; Trauer, 2006:188; Van Zyl, 2005:5).

'Nature-based tourism'[13] is mainly nature-dependent. For example, people seeking to observe animals (such as hornbills) in the wild, require the natural environment in which to enjoy their experience (Conradie, 2010:33). Such birding activity is clearly dependent on nature, and that dependency is the basis of successful tourism (Steven *et al*., 2015:1270; Valentine, 1992:110).

Another type of environmental tourism, ecotourism[14] is one of the most common forms of sustainable tourism as is highlighted in Figure 2.3 (Buckley, 2013:9; UNESCO, 2017). Dowling (2001:294) divides ecotourism into two types: hard and soft tourism. 'Hard tourism' is a form of self-reliant tourism in which tourists seek wilderness-type experiences which require a high degree of challenge (for example white-water river rafting and bungee jumping), whereas education, and environmental and cultural appreciation are the main motivations for 'soft tourism', for example, birding (Morpeth, 2001:215).

'Wildlife watching tourism'[15] is a complex mix of social, biological and ecological sciences, and shares some key characteristics of ecotourism. Wildlife watching tourism should be regarded as sustainable tourism to protect wildlife, their habitat and the communities on which such tourism depends (Newsome, 2017:2; Tapper,

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[13] 'Nature-based tourism' is defined as "tourism in which the viewing of nature is the primary objective. The focus of nature-based tourism is the study and/or the observation of the abiotic (non-living) part of the environment, for example landforms, and the biotic (living) component (fauna and flora)" (Dowling, 2001:290).

[14] Ecotourism is defined as "Purposeful travel to natural areas to understand the culture and natural history of the environment, taking care not to alter the integrity of the ecosystem, while producing economic opportunities that make the conservation of natural resources beneficial to local people" (The International Ecotourism Society [TIES], 2015:1).

[15] 'Wildlife watching tourism' is defined as tourism that is undertaken to view and/or encounter wildlife in a natural setting, and this distinguishes wildlife watching from other forms of wildlife-based activities, such as hunting and fishing (Tapper, 2006:10).

2006:11; Newsome *et al.*, 2005:19). A distinction can be drawn between *consumptive* and *non-consumptive* wildlife tourism. Consumptive activities include hunting and fishing, whereas birding is an example of non-consumptive wildlife tourism (Cong, Lee, Newsome & Wu, 2017; Fennell, 2008:107; Kronenberg, 2014:622; Newsome *et al.*, 2005:6; Rogerson *et al.*, 2013:123).

Towards the right end of Figure 2.3, 'avitourism' is illustrated to form part of nature-based, eco-tourism and wildlife-watching tourism (Biggs, 2013:394; dti, 2010:12; Kim *et al.*, 2010:227; Newsome, 2017:2; Rogerson *et al.*, 2013:122 Sekercioğlu, 2002:282). Avitourism receives considerable attention from conservation leaders, land managers, business leaders and the national press as a viable option for enhancing local economic activity, as well as for the protection and conservation of natural resources (Biggs, 2013:394; Newsome *et al.*, 2005:36; Scott & Thigpen, 2003:200; Sekercioğlu, 2002:282) and has therefore been described as one of the most ecologically sound and sustainable versions of tourism (Connell, 2009:203). Avitourism is a form of tourism that focuses on sustainability (Ma *et al.*, 2013:295; Connell, 2009:215), and thus forms part of sustainable tourism (the third type of alternative tourism). The focus of this study was on '*sustainable avitourism*', which is discussed next.

2.3 CONCEPTUALISATION OF SUSTAINABLE AVITOURISM

In this section, sustainable avitourism is introduced, linking to the first part of the second secondary objective, namely –

> To conceptualise 'sustainable avitourism' and 'environmental and avitourism literacy' from existing literature.

Sustainable avitourism is first defined in section 2.3.1, followed by a discussion on the relationship between avitourism and sustainability (section 2.3.2), and the importance of sustainability principles for avitourism. Lastly, the key stakeholders in sustainable avitourism are outlined in section 2.3.3.

2.3.1 Defining sustainable avitourism

Definitions of avitourism (birding tourism) provided in the literature include birding and birdwatching. Although the term 'birding' is associated with more specialised birding activities (Kim *et al*., 2010:228), these terms are often used interchangeably (Kronenberg, 2014:623).

According to Sekercioğlu (2002:282), birdwatching, or birding is defined as "the act of observing and identifying birds in their native habitats". With its growing popularity, birdwatching progressed from a simple reflective encounter of a bird species, to a more organised outdoor activity (Cobar *et al*., 2017:18). Birdwatching (or birding), is therefore a form of a recreational outdoor activity which encompasses searching for, observing, identifying, and enjoying birds in their native (natural) habitats (Biggs *et al*., 2011:80; Biggs, 2013:394; Cheung *et al*., 2017:817; Cobar *et al*., 2017:18; Eubanks 2010:56; Sekercioğlu, 2002:282; Steven *et al*., 2015:2;). The birding activity refers to the observation and study of birds either with the naked eye or through visual enhancement equipment, such as binoculars, cameras, tripods, spotting scopes, as well as specialised audio equipment, in order to identify and/or capture images (bird photography) and sounds of birds (Cobar *et al*., 2017:18; dti, 2010:5,13; Istomina *et al*., 2016:371). Birding skills therefore range from just encountering and listening to sounds, to bird photography (Cobar *et al*., 2017:18; Wilkinson, Waitt & Gibbs, 2014).

Specialised birding trips are increasingly common, and the word 'twitching' has even been coined for obsessive birding (Kronenberg, 2014:623; Wheeler, 2008:208). 'Twitching' refers to the quest to see rare species, especially those that are difficult to find, or those who are outside their typical geographic range (dti, 2010:5). The term is also associated with fanatical birdwatchers who want to see as many birds as possible and travel long distances to see new or rare birds to add to their bird list (CBI, 2015:2; Kronenberg, 2014:623). Although backyard birding or watching birds around the home is the most common form of birding, birders who take trips away from home (for example away-from-home, non-residential birders or avitourists) participate in a more active form of birding (Kim *et al*., 2010:228).

Birders can participate in different levels of birdwatching activities depending on their travel motivations and skills and are therefore considered "a group of heterogeneous recreationists, exhibiting a diversity of skills and interests" (Hvenegaard, 2002:22; Kellert & Brown, 1985:273; Maple *et al*., 2010:219; McFarlane, 1994:362; Scott & Thigpen, 2003:201; Steven *et al*., 2015:1268; Welford & Barilla, 2013:401). Birders are therefore often categorised according to their skills, motivation, or birding specialisation, for example as committed, active or casual birders (Conradie & Van Zyl, 2016:4; Scott, Ditton, Stoll & Eubanks, 2005:65) or beginner, intermediate or expert (Maple *et al*., 2010:223).

Birdwatching-related travel or travel related to birdwatching is referred to as "avitourism" or "birding tourism" (Cakici & Harman, 2007:133). Steven *et al*., 2015:1259 define avitourism as "the motivated participation in birdwatching as either the sole purpose or a key element of travel". Birdwatching, or the birding activity, is referred to as avitourism (birding tourism) if the birder takes a trip a mile (1.6 km) or more from home for the primary purpose of observing birds (La Rouche, 2003:4). Currently in South Africa, avitourism is defined in the National Avitourism Strategy (NDT, 2011a:10) as travel by birdwatchers, domestically and internationally, outside of a person's usual environment for the purpose of viewing birds in their natural habitats.

Furthermore, avitourism is also defined as a niche tourism market, undertaking overnight travel outside of one's usual environment, for the main purpose of viewing birds in their natural habitat (CBI, 2015:2; Chen & Chen 2015:416; Cheung *et al*., 2017:817; dti, 2010:5; Lindsay, n.d:1; Ryan, 2012:52). Avitourism is centred on components of the natural environment, i.e. birds and their habitat, and is therefore a sub-category of nature-based tourism and wildlife-watching tourism (Biggs, 2013:394; CBI, 2015:2; dti, 2010:12; Kim *et al*., 2010:228; Rogerson *et al*., 2013:122; Steven *et al*., 2015:1258).

Additionally, avitourism is classified as a subset of ecotourism, since it is expected to contribute to the goal of ecotourism of enhanced conservation (Hvenegaard, 2002:21; Sekercioğlu, 2002:282) Avitourism provides incentives for community-based conservation while educating people about biodiversity (Booth *et al*., 2011; Chen & Chen 2015:416; Sekercioğlu, 2002:282).

Avitourism is presented as a viable option for enhancing local economic activity, as well as for the protection and conservation of natural resources (Biggs, 2013:394; Newsome *et al.*, 2005:36; Scott & Thigpen, 2003:200; Sekercioğlu, 2002:282) and has therefore been described as one of the most ecologically sound and sustainable of versions of wildlife tourism (Connell, 2009:203). Avitourism is a form of tourism that focuses on economic, social and environmental sustainability (Connell, 2009:215; Kronenberg, 2014:623; Ma *et al.*, 2013:295), and therefore can be viewed as sustainable avitourism, which can be defined as:

> Avitourism takes full account of its current and future economic, social and environmental impacts, addressing the needs of avitourists, the avitourism industry, the environment, and host communities (adapted from UNEP and UNWTO, 2005:11; UNWTO, 2017b).

In summary, 'sustainable avitourism' mainly refers to:

- a recreational, outdoor activity of searching for, observing, identifying, and enjoying birds in their native (natural) habitats;
- an activity where the birder needs to take a trip away from home (travel outside a person's usual environment) for the primary purpose of observing birds;
- an activity that can be done with the naked eye or which requires specific equipment such as binoculars, cameras, tripods, spotting scopes, as well as specialised audio equipment, in order to identify and/or capture images of and sounds made by birds;

- a niche tourism market and component or sub-category of nature-based, eco- and wildlife watching tourism that is focused specifically on birds and birdwatching as an activity;
- a form of sustainable tourism, since it is expected to contribute to economic, social and environmental sustainability; and
- applies to both domestic and international avitourism.

Sustainable avitourism', however –

- is not backyard birding, which is watching birds around the home, simply noticing birds while mowing the lawn or picnicking at the beach, during trips to zoos or observing captive birds; and
- it excludes bird-hunting tourism (i.e. wingshooting).

Based on the above, the definition of 'sustainable avitourism' is that it is the action of observing, identifying and enjoying birds in their native habitats where the birder needs to take a trip away from home for the primary purpose of observing birds. Furthermore, it is a niche-tourism market (both domestic and international) and a component or sub-category of nature-based, eco- and wildlife watching tourism, which is focused specifically on birds and birdwatching as an activity. Avitourism also takes full account of its current and future economic, social and environmental influences, addressing the needs of avitourists, the avitourism industry, the environment, and the host communities. Lastly, avitourism excludes bird hunting and backyard birding, where the birder merely watches birds around the home, noticing birds while mowing the lawn or picnicking at the beach, or through trips to zoos or the observation of captive birds.

For the purposes of this thesis, the terms 'birding' and 'birdwatching' will be used interchangeably. In this thesis, the term 'birding' refers to birding or birdwatching as an activity performed by avitourists. However, 'avitourism' refers to travel related to birdwatching.

Since avitourism is a form of tourism that focuses on sustainability (Connell, 2009:215; Ma *et al*., 2013:295), and thus forms part of sustainable tourism, the relationship between avitourism and sustainability is discussed next.

2.3.2 The relationship between avitourism and sustainability

Sustainable tourism-development principles, guidelines and management practices are applicable to all forms of tourism, including avitourism (Cooper, 2012:126; Page & Connell, 2014:324; UNWTO, 2017a). Over the past decade and a half, avitourism has also become an increasingly popular mechanism through which to integrate conservation, environmental sustainability and socio-economic development (Biggs, 2013:394; Connell, 2009:215; Kronenberg, 2014:623; Ma *et al*., 2013:295;). Figure 2.4, illustrates the three key pillars that support the triple bottom line approach to sustainable avitourism.

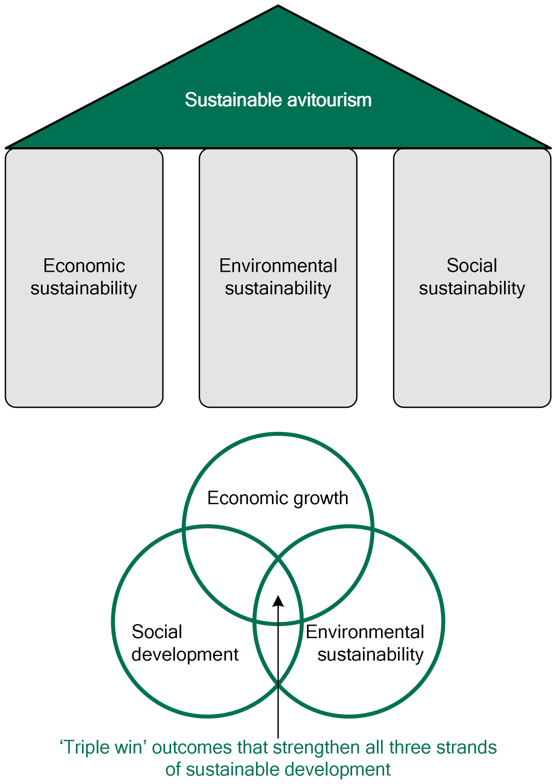


Figure 2.4: The pillars of sustainable avitourism

Source: Adapted from Cooper (2012:122); Le Grange, Loubser and Le Roux (2017:133)

The three pillars of sustainable avitourism are interlinked and are mutually reinforcing economic, social and environmental sustainability (Cooper, 2012:121). Each pillar should be given equal weight or attention when striving for sustainability and well-being in all endeavours (Page & Connell, 2014:324). Equal weighting can be equated with equilibrium, meaning that a suitable balance must be established between the three pillars to guarantee long-term sustainability (Page & Connell, 2014:324; UNEP and UNWTO, 2005:11).

Table 2.1 provides a summary of examples illustrating the benefits that can be derived from sustainable avitourism. A summary of each of the three pillars, economic, social and environmental sustainability are given according to the sustainable avitourism objectives, the benefits or impacts deduced from avitourism, as well as international and South African examples of the benefits that can be derived from sustainable avitourism.

Table 2.1: Summary of economic, social and environmental sustainability relating to avitourism

The pillars of sustainable avitourism	Economic sustainability	Social sustainability	Environmental sustainability
1. Sustainable avitourism objective	• Sustainable avitourism should "ensure viable, long-term economic operations, providing socio-economic benefits to all stakeholders that are fairly distributed, including stable employment and income-earning opportunities and social services to host communities, and contributing to poverty alleviation" (UNWTO, 2017d; Cooper, 2012:121).	• Sustainable avitourism should "respect the socio-cultural authenticity of host communities, conserve their built and living cultural heritage and traditional values, and contribute to inter-cultural understanding and tolerance" (UNWTO, 2017d; Cooper, 2012:121).	• Sustainable avitourism should "make optimal use of environmental resources that constitute a key element in tourism development, focus upon the stewardship of resources, maintaining essential ecological processes, and helping to conserve natural heritage and biodiversity" (UNWTO, 2017d; Cooper, 2012:121).
2. Benefits or impacts deduced from avitourism	• Primary economic impacts of avitourism relate to foreign exchange earnings, contributions to government revenues, the generation of employment and income, and the stimulation of regional development (Hashimoto, 2015:205; Lickorish & Jenkins, 1997:63). • The economic effect of avitourism on the travel and retail market include food and beverages, accommodation, transportation, birding equipment (e.g. binoculars, cameras, spotting scopes) bird guide book publishing, wild bird food, and membership in bird life organisations (Kim *et al.*, 2010:228; Çakici & Harman, 2007:134).	• Avitourism development has a positive impact on local communities by creating socio-economic wealth and environmental conservation (Biggs *et al.*, 2011:87). • Improvement of living conditions, quality of life and well-being of populations (Hashimoto, 2015:205). • Increased literacy rates, access to health care and clean water supplies. • Broad socio-political aims, such as improving freedom of choice and promoting the opportunity for endogenous decision-making (Hashimoto, 2015:205). • The protection of birds and their habitat can lead to sustained environmental integrity, thereby providing socio-	• Avitourism is as an environmentally conscious activity that provides economic hope for many threatened natural areas around the world (Ryan, 2012:53; Cordell & Herbert, 2002:54). • A primary benefit of avitourism is that participants gain a greater awareness of the values of biodiversity and conservation of natural resources (Ryan, 2012:53; dti, 2010:22; Ellis & Vogelsong, 2004:204; Sekercioglu, 2002). • Sustainable avitourism promote responsible travel, with education and interpretation as the foundation, that will make avitourists and local communities aware of the environment and

The pillars of sustainable avitourism	Economic sustainability	Social sustainability	Environmental sustainability
	• Create multiplier effects for the economy of local communities (Kim *et al*., 2010:228).	cultural sustainability benefits (e.g. improving quality of life, maintaining natural heritage) (Cottrell & Raadik-Cottrell, 2012:311). • Avitourism potentially provides an alternative source of income and employment, for example local bird guides in rural areas (Biggs, 2013; Çakici & Harman 2007:134; Sekercioglu, 2002:287). • Non-cash benefits, i.e. local ownership and strength of local property rights, education, equity and empowerment are often more important than monetary incentives for conservation (Biggs *et al*., 2011:87).	how their actions can contribute to conserving birds (Diamantis, 2004:12).
3. International avitourism examples	• In the USA, there were about 47 million birdwatchers over the age of 16 in 2011, about 20% of the population (U.S. Fish & Wildlife Service, 2014). • In the USA, birdwatchers spent $41 billion on trips and equipment, generating $107 billion in total industry output including direct, indirect, and induced effects from these expenditures, generate 671,000 jobs, and contribute $11 billion in local, state, and federal tax revenue (Chen & Chen, 2015:416; Eubanks, 2010:56).	• In Herowana village (Pacific Islands), the local Gimi people act as bird guides and provide other tourism-related services that generate income to meet basic needs and serve as incentives for maintaining the rainforest, a renowned threatened ecosystem (Zeppel, 2006:53). • Consequently, participants gain a greater awareness of the values of biodiversity and the conservation of natural resources, achieving another primary benefit of avitourism (Ellis & Vogelsong, 2004:204).	• In the Mürits National Park (Germany), a participatory planning process was used to involve all relevant stakeholders, providing an important mechanism for integrating conservation with the rural development of the region (Tapper, 2006:44). • Controlled visitation and minimising impacts offer significant benefits for conservation by keeping the disturbance of the cranes to a minimum, providing incentives for tour companies linked to crane

The pillars of sustainable avitourism	Economic sustainability	Social sustainability	Environmental sustainability
		• The generated income derived from avitourism provides an incentive to conserve the particular bird species as well as their habitats (Tapper, 2006:32).	conservation and promoting greater awareness of crane conservation. • Good interpretation of the behaviour and ecology of the cranes – provide a high-quality visitor experience and ensuring good visitor behaviour (Tapper, 2006:45).
4. Avitourism examples in South Africa	• The total size of the avitourism market in South Africa is between 21 000 and 40 000 avitourists annually (dti, 2010:16). • Of this total, the number of active and potential domestic avitourists in South Africa ranges between 13 000 and 24 000 consumers. • Avitourists spend an estimated R927 million to R1.725 billion, on birding trips, support services and equipment annually. • Using a conservative multiplier of 1.3, the study noted that potential contribution of avitourism to GDP, in 2009, was in the range of R1,205 billion to R2,243 billion annually (dti, 2010:16).	• Birding has also encouraged community-based avitourism projects in South Africa (dti, 2010:21) providing socio-economic benefits such as employment and income benefits to local bird guides (Biggs *et al.*, 2011:85). • Less tangible benefits, i.e. the generation of a sense of pride and ownership and stewardship over birds and natural habitats can emerge (Biggs, 2013:399; Biggs *et al.*, 2011; Biggs, 2006). • Many local guides indicated a noteworthy increase in their sense of self-worth and their capacity for self-determination (Biggs *et al.*, 2011:86). A local bird guide quoting from a study on community-based avitourism initiative in South Africa (Biggs *et al.*, 2011:86)	• Zululand Birding Route: many birding sites have their own equivalent of a Site Support Group[17] in the form of community and other stakeholder groups that play a role in the conservation of the birding sites (Biggs, 2013:395; Biggs, 2006).

[17] Site Support Groups are community-based organisations that work towards conservation and sustainable development at and around a particular site.

The pillars of sustainable avitourism	Economic sustainability	Social sustainability	Environmental sustainability
	• The community based avitourism projects (CBAT) in South Africa, i.e. Zululand Birding Route[16] – avitourism provides tangible income benefits to local guides and a cost-effective way to create jobs in South Africa (Biggs *et al*., 2011:88).	indicated empowerment benefits: "Now I can go out and do something valuable with my life that can make a difference". • In addition, there was an increase in guides' sense of pride in their local environment, and a desire to share their newfound knowledge with their community and visitors. They also indicated strengthened success in conservation and awareness activities as described in the following quote: "Learning about bird identification, bird behaviour, bird ringing and measuring has opened a whole new world to me. By taking out schoolchildren this awareness can be widened" (Biggs *et al*., 2011:86).	

[16] Birding routes aim to cluster activities, developments and user-friendly infrastructure along a particular route and stimulate partnerships and cooperation among communities to stimulate economic development (Biggs, 2013:395; Biggs et al., 2011:81).

From Table 2.1, it is evident that sustainability principles apply to economic, social and environmental aspects of avitourism. It is important that a suitable balance be achieved between these interconnected elements to guarantee the long-term sustainability of avitourism (Page & Connell, 2014:323). This implies that the main concern of sustainable tourism is to find an equilibrium between the needs of the host community, the tourists and the environment. This relationship requires careful consideration to maximise the benefits and minimise the negative impacts of tourism (Page & Connell, 2014:324). Sustainable tourism therefore does not imply a 'no-growth' policy, but recognises that limits to growth exist and that tourism must be managed with a long-term view (Page & Connell, 2014:324).

The application of sustainability principles in avitourism and responsibility on the part of the various stakeholders in avitourism is imperative. The various stakeholders in the avitourism arena should apply the sustainability principles. The key stakeholders involved in sustainable avitourism are discussed in the next section.

2.3.3 Key stakeholders in sustainable avitourism

Avitourism involves different groups of stakeholders. The implementation of sustainable avitourism initiatives will only be effective if all relevant stakeholders are involved through a participative planning process (Cooper, 2012:130; Newsome *et al.*, 2005:260; Tapper, 2006:18). Figure 2.5 illustrates the key stakeholders in sustainable avitourism.

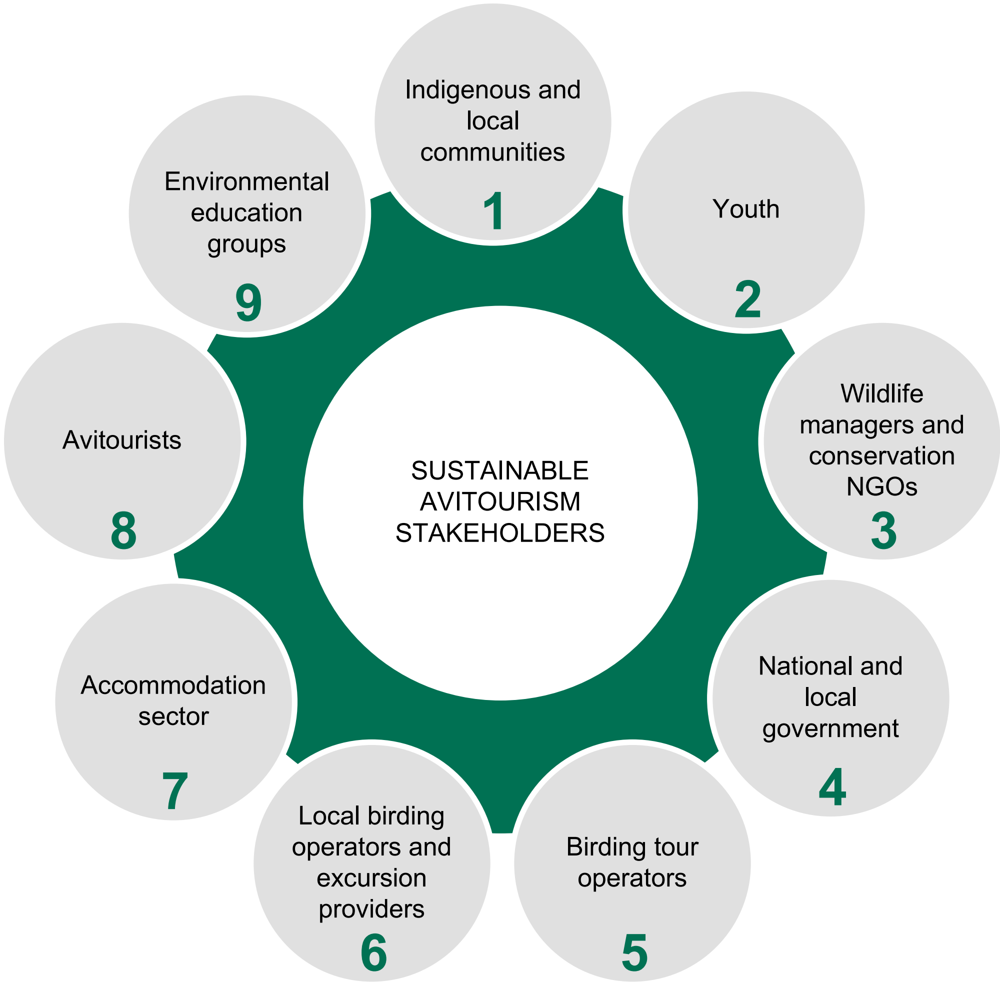


Figure 2.5: Key stakeholders in sustainable avitourism

Source: Adapted from Cooper (2012:129); dti (2010:46,48); Farber (2015:19); Newsome *et al*. (2005:69); Page and Connell (2014:328); Tapper (2006:19); UNESCO (2017); United Nations (N.d.(b)); UNWTO (2017a)

A comprehensive summary of each of these nine groups of sustainable avitourism stakeholders, their core areas of interest and their roles in sustainable avitourism, as well as examples of sustainable avitourism in South Africa, is tabulated in Table 2.2.

Table 2.2: Stakeholder groups, their interest in sustainable avitourism, and examples of avitourism in South Africa

Stakeholder group	Core areas of interest in avitourism and role in sustainability	Avitourism examples in South Africa
1. Indigenous and local communities	• Protection of environmental and livelihood assets • Minimisation of disruption to their communities and culture • Potential to gain benefits through avitourism linked to the improvement of local services and infrastructure, employment and local business opportunities, and revenue generation • Enable all members of civil society to be actively engaged in sustainable development • Environmental education of the general public, including school learners, to ensure the conservation of birds and birding sites for the future • Responsible environmental behaviour • Respect the natural character of the area • Promote gender equality and women's empowerment and to ensure their full and effective participation in sustainable development policies, programmes and decision-making at all levels	• BLSA has launched the Community Bird Guide Training Programme, which is designed to give local community members the opportunity to participate in avitourism businesses or work as entrepreneurs • Guides are encouraged to create a broad awareness of conservation within their communities and ensure an understanding of the natural environment, as their 'product', which is what attracts tourists and income for the community • The programme also creates awareness of the economic benefits of birds and their habitats to the local community • The Zululand Birding Route, for example, provides a support structure for local guides and community-based tourism developments, including an office base from which to operate, a booking service, a tourist information office, mentoring of guides, and the development of infrastructure relative to guides' areas of operation
2. Youth	• Environmental education of the youth, including school learners, to ensure the conservation of birds and birding sites in future • Responsible environmental behaviour and taking action to preserve the environment • Get involved in the SDGs – children and young women and men are critical agents of change and will find in the	• BLSA provide environmental education for school learners to ensure the conservation of birding sites for the future • BLSA introduced an exclusive membership programme aimed at the youth, namely 'Fledge – young birders' conservation club'

Stakeholder group	Core areas of interest in avitourism and role in sustainability	Avitourism examples in South Africa
	SDGs a platform to channel their infinite capacities for activism into the creation of a better world • Active participation of young people in decision-making processes, as the contribution of children and youth is vital for the achievement of sustainable development	
3. Wildlife managers in the public and private sectors; conservation non-governmental organisations (NGOs)	• Protection of bird habitats, biodiversity and the general environment • Potential to generate revenue and greater awareness through avitourism to support conservation • Demonstration of the value of bird conservation to indigenous and local communities, the government and the wider public • Advance sustainable development initiatives, taking into account the importance of corporate social responsibility	• BLSA is a local partner of BildLife® International, a global coalition of NGOs focusing on bird conservation • Avitourism will help BLSA achieve its bird conservation and habitat protection objective by adding economic value to birds and their habitat • South African National Parks (SANParks) offers avitourism products and focuses on bird conservation
4. National and local government	• Economic and development potential of avitourism at national, regional and local levels • Planning and implementation of sustainable development policies • Responsible sustainable development of avitourism to ensure bird conservation and habitat protection • Support environmental education at schools for a sustainable future	• The dti (2008:6) recognises avitourism as an important niche market with economic growth potential in South Africa • South African Tourism (national marketing body for tourism to and within South Africa) markets the country as a top birding destination, offering an attractive combination of a variety of birds, well-developed international and domestic transport systems and a user-friendly and supportive avitourism industry (South African Tourism, n.d.b) • Sisonke Municipality (located in the south-west of KwaZulu-Natal, on the border of the Eastern Cape and Lesotho), identified avitourism as a key focus in its district tourism plan

Stakeholder group	Core areas of interest in avitourism and role in sustainability	Avitourism examples in South Africa
5. Birding tour operators	• Potential to develop and market avitourism products based on birdwatching in a sustainable manner – this depends not only on market demand, but also on local conditions including infrastructure and site accessibility, suitability of accommodation and catering, and the availability of reliable local business partners to provide on-the-ground services (ground operators and accommodation) • Corporate sustainability reporting	• Birding tour operators (for example, Rockjumper Birding Tours and Birding Africa) offer birding tours worldwide. • The Tour Operators Initiative (TOI) is an excellent example of a sector of the industry getting together, and which is committed to operating and marketing avitourism in a sustainable manner
6. Local birding operators and excursion providers	Potential to develop and market avitourism products based on birdwatching in a sustainable manner – this can be done for a mainly local or regional market, but to reach international markets, local operators will generally need to build links with an international tour operator based overseas	• Local birding operators (for example, Button Birding) offer tours to a Blue Swallow breeding site in KwaZulu-Natal • An exciting initiative along all the birding routes in South Africa is the availability of community bird guides, who are trained by BLSA's Community Bird Guide Training Programme
7. Accommodation sector	• Potential of birdwatching as an attraction for guests, to increase visitor numbers and their lengths of stay • Adoption of environmentally friendly operations and continuous improvement of environmental performance • Promoting a code of conduct and ethical behaviour • Operation of a sustainable social development fund • Triple bottom line (economic, social and environmental) sustainability reporting	• Accommodation establishments along the birding routes in South Africa (for example, Beacon Vlei guest farm and Avian Leisure) are registered as 'birder friendly' and are members of BLSA • The birder-friendly establishments are committed to sustainable tourism and regard ecotourists as friends who share their passion and vision
8. Avitourists	• Interesting birdwatching activities, memorable experiences, good interpretation and guiding • Raising awareness about sustainability issues and promoting sustainable avitourism practices amongst avitourists	• Avitourists are interested in birding opportunities (for example, visiting the Blue Swallow breeding site in KwaZulu-Natal) • Sasol Bird Fair (South Africa) – this event is designed to raise awareness of birds, habitat protection and avitourism

Stakeholder group	Core areas of interest in avitourism and role in sustainability	Avitourism examples in South Africa
	• Codes of conduct for responsible avitourism	• BLSA provide leadership by adhering to guidelines of good birding behaviour (Birder's Code of Ethics)
9. Environmental education groups	• Incorporate the importance of birds and bird habitats into environmental education programmes • Incorporate birding (birdwatching) activities in environmental education programmes, for example at schools in a formal setting (promoting place-based education) • NGOs, such as zoos, aquariums, museums, parks, and conservation organisations are often providers of opportunities for environmental education • Encourage outdoor activities, outdoor recreation or fieldtrips that include themes of birds and birdwatching • Encourage avitourism, for example participating in a birding trip	• Wakkerstroom environmental education programme • Environmental education programme focused on birds at the National Zoological gardens • Sasol Bird Fair incorporating environmental education focusing on birds

Source: Adapted from BLSA (n.d.); Cooper (2012:129); dti (2010:46,48); Farber (2015:19); Newsome *et al*. (2005:69); Page and Connell (2014:328); Tapper (2006:19); UNESCO (2017); United Nations (N.d.(b)); UNWTO (2017a)

Table 2.2 indicates that each group of stakeholders has a different role to play if avitourism is to be successful in the long term. The researcher also highlights the stakeholders’ roles in the sustainability of avitourism, from an economic, societal and environmental perspective. Environmental education for school learners, to ensure the conservation of birds and birding sites in future years, is highlighted in the table.

Ultimately, only education can create the level of environmental literacy needed to sustain bird life and the natural environment in which birds live, which is the resource base needed to support sustainable avitourism (Elder, 2003:4; Saylan & Blumstein, 2011:157; Urry, 2011:132; Van As *et al*., 2012:412; Wheeler, 2012:123).

For the present study, *environmental education strategies* that will encourage changes in values, mind-sets and behaviours of secondary school learners, concerning the sustainability of birds and the natural environment was investigated. From the environmental education and environmental literacy domains, environmental literacy was identified as an approach to promote pro-environmentalism over the long-term and to improve the environmental attitude and behaviour of all citizens (including secondary school learners). ‘Environmental literacy’ and ‘avitourism literacy’, are conceptualised in the next section.

2.4 CONCEPTUALISATION OF ‘ENVIRONMENTAL AND AVITOURISM LITERACY’

In this section, ‘environmental and avitourism literacy’ is conceptualised, linking to the first part of the second secondary objective, namely:

> To conceptualise ‘sustainable avitourism’ and ‘environmental and avitourism literacy’ from existing literature.

To establish context, ‘environmental and avitourism literacy’ is firstly discussed within the broader sense of the literacy context (2.4.1). Secondly, a definition for ‘environmental and avitourism literacy’ was developed from secondary literature in the environmental education and literacy domains and are presented in 2.4.2. Lastly, the categories and components of ‘environmental and avitourism literacy’ are outlined, which include a discussion of the ‘environmental and avitourism literacy continuum’ (2.4.3).

2.4.1 Literacy context

In general, literacy is defined as “the ability to read and write” and as “competence or knowledge in a specified area” (Oxford English Dictionary, N.d.). Literacy also refers to the “possession of education” and “a person’s knowledge of a particular subject or field”, for example, to improve financial literacy or to acquire computer literacy (Dictionary.com, N.d.). Although traditionally, literacy has been defined primarily as the ability to read and write, current concepts of literacy are much broader (Weigle, 2014:64). Since various types or forms of literacy have emerged (i.e. computer literacy, digital literacy, financial literacy, health literacy, media literacy and environmental literacy), literacy can be described as a context-dependent construct (Moersch, 2014:50; Weigle, 2014:64). Figure 2.6 illustrates the literacy context on which this study is based, namely ‘environmental and avitourism literacy’.

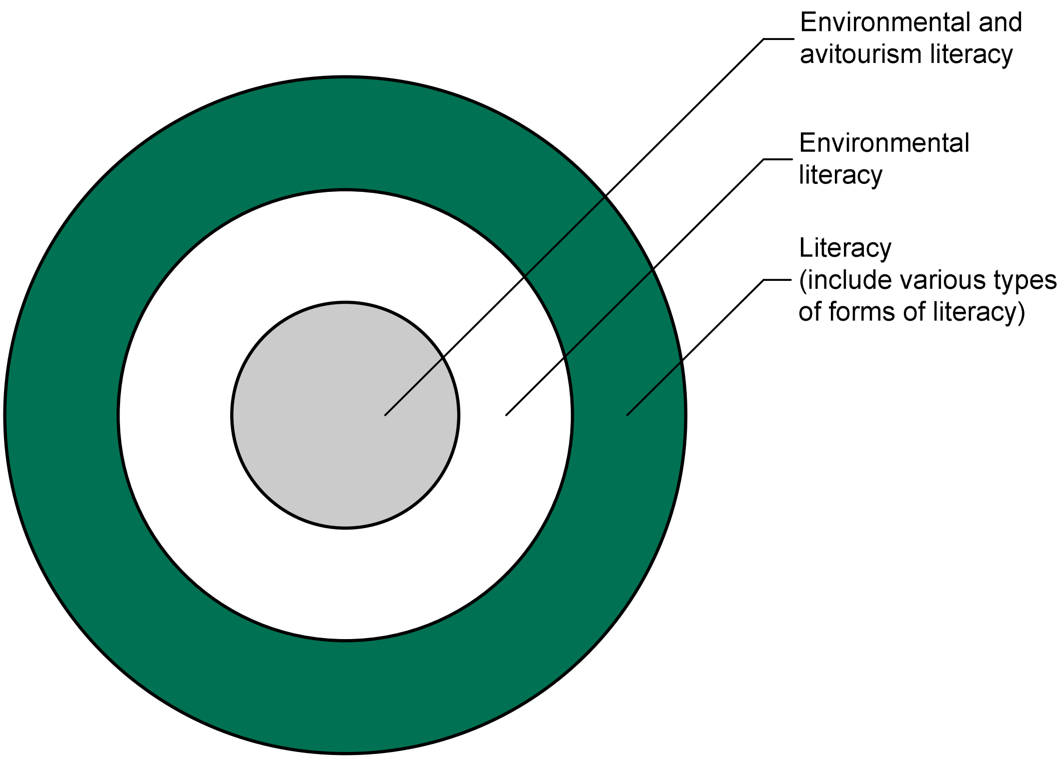


Figure 2.6: Environmental and avitourism literacy context

The outer circle represents the core concept ‘literacy’ in a broader context, i.e. ‘the possession of education’, which includes all the different types or forms of literacy. According to Moersch (2014:50), the 21st-century themes for literacy are global awareness, financial, economic and entrepreneurial literacy, civic literacy, health literacy and environmental literacy. ‘Environmental literacy’, one form of literacy, is a concept and term that has gained traction in the academic literature and the field of environmental education, particularly over the past few decades (Hollweg, Taylor, Bybee, Marcinkowski, McBeth & Zoido, 2011:1-1; Roth, 1992:vii). For the present study, ‘environmental literacy’ was identified as an approach to promote pro-environmentalism over the long term and to improve the environmental attitudes and behaviours of secondary school learners. According to Swanepoel, Loubser and Chacko (2002:282), the potential of environmental literacy as a vehicle to realise the educational agenda of sustainable development cannot be over-emphasised.

Since the focus of the present study was specifically on the sustainability of birds, the natural environment in which birds live (the bird habitat), and avitourism, the concept of ‘environmental literacy’ was taken from the environmental education and environmental literacy fields and was applied to the context of birds and bird habitats. ‘Environmental and avitourism literacy’ is defined next.

2.4.2 Defining ‘environmental and avitourism literacy’

The terms ‘environmental education’ and ‘environmental literacy’ are used interchangeable in literature. However, according to Elder (2003:7), it is not precisely the same. Environmental education[18] is recognised as an interdisciplinary, holistic process that is about lifelong learning (Farber, 2015:17), which assists in developing awareness, knowledge and attitudes regarding the natural environment, acquire skills and motivation to act as an active citizenship so as to resolve environmental problems and issues, and finally develop active involvement in preventing environmental problems and protecting and improving the environment (Hsu, 1997:29; McBeth & Volk, 2010:55). The desired outcome and ultimate goal of ‘environmental education’ are to develop an environmentally literate citizenry that become engaged in making the world sustainable and in undertaking conservation action or behaviour (Erdoğan, 2009:37; Farber, 2015:17; Harvey, 1977:67; Hsu,

[18] Environmental education is defined as “the process through which children come to understand and appreciate the environment and their connection to it. It aims to develop the skills and willingness to make decisions and take action to sustain the environment” (Murdoch, 1993:3).

2004:37; Roth, 1992:2). ‘Environmental literacy’ thus reflects the intended outcome and fundamental goal related to the process of ‘environmental education’ (Elder, 2003:7; Erdoğan, 2009:37; Farber, 2015:17; Igbokwe, 2012:649;).

Various researchers have done work to operationalise ‘environmental literacy’ (Elder, 2003:15; Goldman, Assaraf & Shaharabani, 2013:517; Harvey, 1977:67; McBeth & Volk, 2010:55; Roth, 1992:8). However, in the literature, the debate about a clear definition continues.

Of the early attempts to conceptualise environmental literacy include those by Harvey (1977:67) and Roth (1992:8). Harvey (1977:67) defines an environmentally literate person as “one who possesses basic skills, understandings, and feelings for the man-environment relationship”. According to Roth (1992:8), environmental literacy is the capacity to perceive and interpret the relative health of environmental systems and to take appropriate action to maintain, restore, or improve the health of those systems. Hsu (2004:38) expanded on Roth’s (1992) definition and refers to environmental literacy as –

> An individual’s knowledge about and attitudes toward the environment and environmental issues, skills and motivation to work toward the resolution of environmental problems, and active involvement in working toward the maintenance of dynamic equilibrium between the quality of life and quality of environment.

Elder (2003:14) includes the concept of sustainability when defining environmental literacy as “an individual’s capacity to understand broadly how people and societies relate to each other and to natural systems, and how they might do so sustainably”. According to Elder (2003:15), this requires sufficient awareness, knowledge, skills, and attitudes to incorporate appropriate environmental considerations into daily decisions about consumption, lifestyle, career, and civics and to engage in individual and collective action for the environment.

Roth (1992:9) further elaborates that environmental literacy draws on four major elements, namely knowledge, skills, affect (environmental sensitivity, attitudes and values) and behaviour (personal investment and responsibility, and active involvement). Reflecting on the components of environmental literacy, the North

American Association for Environmental Education (NAAEE, 2011), and partners, describe environmental literacy as comprised of various components, including competencies, knowledge, dispositions, skills, and environmentally responsible behaviour. Loubser *et al*. (2001:318) also outline the components of environmental literacy in their definition:

> The ability to be aware of one's environment. It enriches one with the knowledge to realise the imbalances and threats the environment faces and enables one to form positive attitudes towards it with the aim of developing skills to resolve and prevent environmental problems and urge to protect and improve the environment for the present and future generations by active participation.

Furthermore, environmental literacy is considered a continuum of competencies ranging from complete unawareness to a deep, thorough understanding and concern for the environment (Elder, 2003:16; Ibitz, 2017:58; Loubser *et al*., 2001:318–319; Roth, 1992:8).

Watching birds, appreciating bird habits and migrations provide great opportunities to reconnect with nature, to investigate the community, and learn about global connections, and therefore could contribute to the development of environmental literacy (Can *et al*., 2017:733). Research conducted by Can *et al*. (2017:733) on a workshop designed to support teachers in conducting birdwatching activities with their learners in Turkey, highlighted the role of birdwatching activities to promote bird and environmental education. Since birds live nearly everywhere, they provide an ideal opportunity for becoming involved in the natural environment of the local community (Can *et al*., 2017:733).

For the purpose of the present study, the term '*environmental literacy*' was taken and applied to the context of birds and the natural environment in which birds live. In summary, 'environmental and avitourism literacy' refers mainly to:

- environmental literacy concerning birds, the natural habitat of birds and sustainable avitourism and birdwatching activities;
- the intended outcome related to the process of 'bird and environmental education';

- various components or elements, including knowledge, skills, affect (environmental sensitivity, attitudes and values) and behaviour (personal investment and responsibility, and active involvement);
- a continuum of competencies ranging from complete unawareness to a deep and thorough understanding and concern for the environment;
- awareness of birds and the natural environment in which birds live;
- knowledge of birds and the natural environment;
- positive attitudes and values towards birds and bird habitats;
- developing skills to resolve and prevent environmental problems affecting birds;
- behavioural intention towards birds and the natural environment (i.e. intended pro-environmental behaviour);
- protecting birds and improving the natural environment in which birds live for the present and future generations by active participation (i.e. actual pro-environmental behaviour towards birds and the environment); and
- learners becoming engaged in making the world more sustainable.

For the purpose of this study, 'environmental and avitourism literacy' referred to:

> An individual's awareness and affinity, knowledge, values, behavioural intentions and actual pro-environmental behaviour towards birds, the natural environment, and sustainable avitourism (or birdwatching), to protect birds and improve the natural habitat of birds in which birds live for the present and future generations.

These definitions, not only provide a background and context for this study, but also assist when we consider how to operationalise or transform the concept into an instrument that would measure the underlying categories and components of environmental and avitourism literacy (Farber, 2015:16). The major categories and components of environmental and avitourism literacy are discussed next.

2.4.3 The categories and components of environmental and avitourism literacy

Perhaps the most widely recognised goals, objectives, and guiding principles of environmental education were those agreed upon at UNESCO's Tbilisi

Intergovernmental Conference (UNESCO, 1978:15). The Tbilisi Declaration highlights the categories of environmental education objectives (UNESCO, 1978:15):

- *awareness*: to help social groups and individuals acquire awareness and sensitivity to the total environment and its allied problems;
- *knowledge*: to help social groups and individuals gain a variety of experiences of, and acquire a basic understanding of the environment and its associated problems;
- *attitudes*: to help social groups and individuals acquire a set of values and feelings of concern for the environment and the motivation for actively participating in environmental improvement and protection;
- *skills*: to help social groups and individuals acquire the skills for identifying and solving environmental problems; and
- *participation*: to provide social groups and individuals with an opportunity to be actively involved at all levels in working toward resolution of environmental problems.

When these categories of objectives are viewed in the context of the Tbilisi Declaration, they represent stepping stones to prepare and enable citizens, including secondary school learners, to become actively involved in the prevention and resolution of environmental problems and issues (Hollweg *et al*., 2011:2-2; McBeth, Hungerford, Marcinkowski, Volk & Meyers, 2008:2). The environmental education objectives are also incorporated into the environmental literacy ladder (Elder, 2003:16). The ladder illustrated in Figure 2.7 shows five essential components of the environmental and avitourism literacy continuum (Elder, 2003:16).

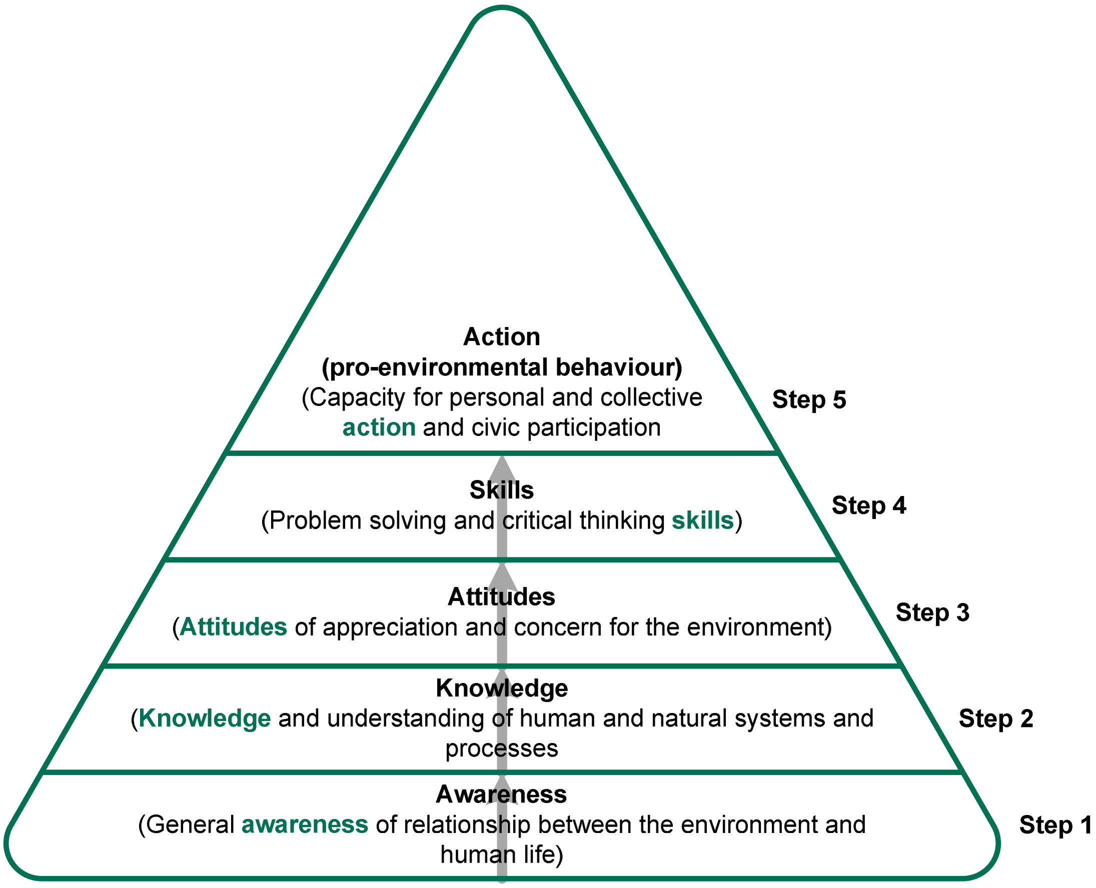


Figure 2.7: Climbing the environmental and avitourism literacy ladder

Source: Adapted from Elder, 2003:16

In his seminal work, '*Environmental literacy: Its roots, evolution and directions in the 1990s*', Roth (1992:17) operationalised the concept 'environmental literacy', disagreeing with those who regard literacy as binary, which means a person is either literate or not literate. Roth (1992:8) considers environmental and avitourism literacy to be a continuum of competencies ranging from zero competency to very high competency. The broad spectrum of environmental literacy ranges from complete unawareness to a deep, thorough understanding and concern for the environment (Swanepoel *et al*., 2002:282; Loubser *et al*., 2001:318). This process is portrayed as the five steps of 'climbing the environmental literacy ladder' from general environmental awareness to collective action for the environment, as illustrated in Figure 2.7. Since changes towards action or pro-environmental behaviour are not easy to accomplish, it requires continuous efforts, a step-by-step build-up of environmental competencies, collecting personal experiences and an emotional attachment to nature (Ibitz, 2017:58).

Furthermore, research reported (e.g. McBeth & Volk, 2010:55; Swanepoel *et al*., 2002:283) regarding the measurement of environmental literacy, has recognised observable constructs (components) as encompassed in the environmental education objectives of the Tbilisi Declaration, and in the environmental literacy ladder as explained earlier. The following 11 components measuring environmental literacy were identified in secondary literature, including ecological and environmental knowledge, cognitive skills, affective disposition, values, attitudes, environmental sensitivity, motivation, intention to act, commitment (verbal and actual), participation, environmental behaviour and environmental involvement (Culen & Mony, 2003:26; Hollweg *et al*., 2011:2–3; Hsu, 2004:38; Kollmus & Agyeman, 2002:239; McBeth & Volk, 2010; Swanepoel *et al*., 2002:283).

A number of environmental literacy measuring instruments have been developed, which include essential components of environmental literacy, for example the Middle School Environmental Literacy Instrument (MSELI) (McBeth *et al*., 2008:2). The common groups of environmental literacy components used in the environmental literacy measuring instruments include:

- awareness, knowledge, attitude, participation (Swanepoel *et al*., 2002:283);
- knowledge, environmental issue awareness, knowledge of skill, evaluation of environmental issues (Culen & Mony, 2003:26);
- awareness, knowledge, attitude, skills and participation (UNESCO, 1978:15);
- environmental knowledge, affect, cognitive skills and environmentally responsible behaviour (Erdoğan, 2009:11);
- cognitive knowledge, cognitive skills, affect, behavioural intention and behaviour (McBeth *et al*., 2008:2; McBeth & Volk, 2010:57); and
- knowledge, cognitive and affective dispositions, cognitive skills, behaviour (Hollweg *et al*., 2011:2–3).

In addition, according to Zsóka *et al*. (2013:128), the main goal of environmental education should thus be to engage students with a complex toolset – containing cognitive, affective and action elements, which foster behavioural change. Littledyke (2006) therefore emphasises the need for connecting the cognitive (i.e. facts, knowledge or understanding) and affective (emotion, feelings, values or attitudes) domains of environmental literacy to install sustainable behaviour among, in this case, secondary school learners.

Based on the previous discussion, Figure 2.8 illustrates the main categories and components in environmental literacy as applied to the context of the present study, focusing on birds and the natural environment in which birds live.

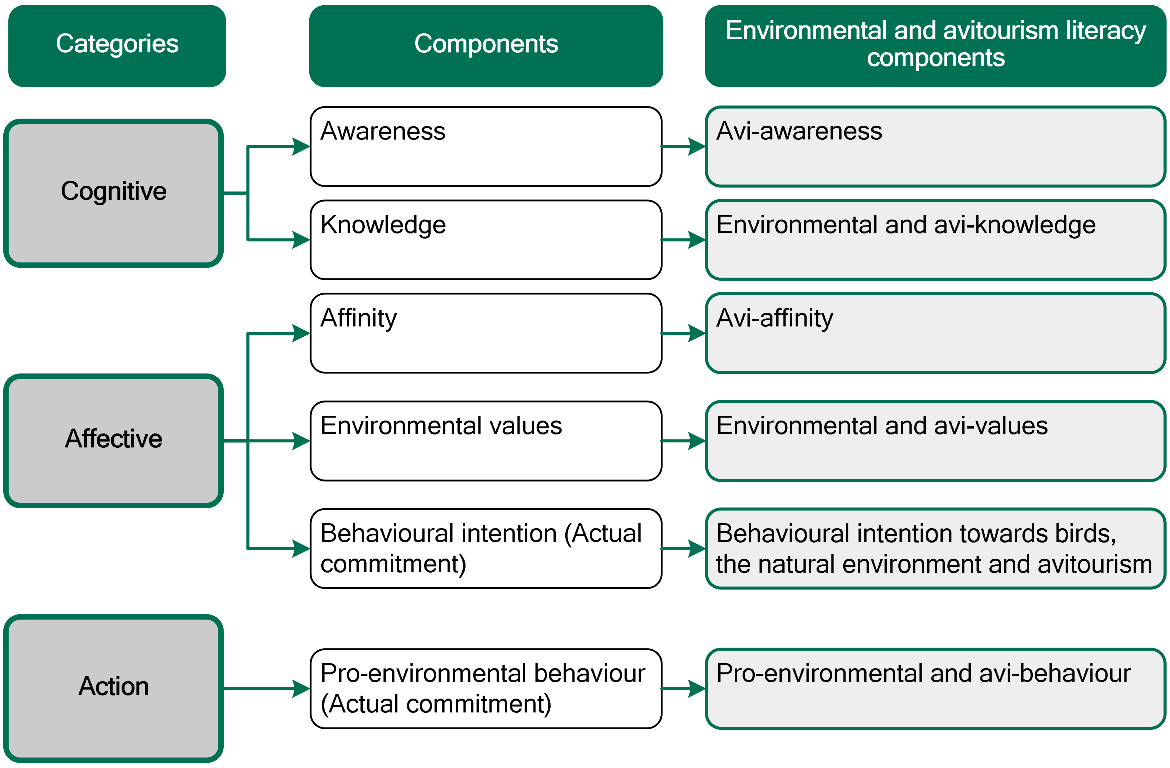


Figure 2.8: The categories and components of environmental literacy and its application to the present study

Source: Compiled from Elder (2003:16); Erdoğan (2009:47); Hsu (2004:44); Igbokwe (2012:651); McBeth *et al*. (2008:2); McBeth and Volk (2010:57); Roth (1992:9)

Figure 2.8 illustrates that environmental literacy consists of the three main categories, namely cognitive,[19] affective[20] and action.[21] The components of environmental literacy are embedded within the main categories. The literature review provided evidence to support the selection, definition and measurement of the following environmental and avitourism literacy components included in the present study:

- environmental and avi-orientation (consisting of awareness: cognitive and affinity: affective);
- environmental and avi-knowledge (cognitive);
- environmental and avi-values (affective);
- behavioural intention (affective); and
- actual pro-environmental and avi-behaviour (action).

Furthermore, these components will be used in the development of a conceptual framework for the present study (*Phase 2* of the methodological procedure indicated in Figure 1.2) that will be presented in Chapter 3.

In line with the Tbilisi Declaration (UNESCO, 1978:15), as outlined in section 2.4.3, the ultimate objective of environmental education and a core component of environmental and avitourism literacy, is environmentally responsible behaviour, or pro-environmental behaviour (section 1.5.8). Pro-environmental behaviour overlaps the aims, objectives and guiding principles of environmental literacy (Chacko, 2000:57; Ibitz, 2017:57). According to Hollweg *et al*. (2011:3-1), pro-environmental behaviour is the ultimate expression of environmental literacy. In the following section, six models in the field of environmental literacy and environmental behaviour, applicable to the present study, are illustrated.

[19] Cognitive skills include "skills for investigating environmental problems and issues, including identification, analysis, and evaluation; and skills for dealing with action strategies, including their appropriate selection and planning, implementation, and evaluation of discrete action" (Marcinkowski, 1997:168).

[20] Affective skills are reflective of "valuing, organising values into system, integrating values into a world view of ethics, and acting according to these" (Marcinkowski, 1997:168).

[21] Action skills are described as "the ultimate goal of environmental literacy, reflected in developing the capacity for action and participation" (Elder, 2003:16).

2.5 MODELS RELATING TO ENVIRONMENTAL LITERACY AND ENVIRONMENTAL BEHAVIOUR

Scholars in the field of environmental literacy and environmental behaviour developed theories and models to determine variables associated with and central to understanding pro-environmental behaviour. In essence, which components or variables will lead to, result in or influence our actions or behaviour, in this case pro-environmental behaviour? These models were investigated to assist with the development of the conceptual framework for the present study, linking to the third secondary objective:

> To develop a conceptual literacy framework aimed at facilitating behavioural change within secondary school learners' behaviour towards birds, the natural environment and avitourism.

Building upon the definitions and theory of 'environmental and avitourism literacy', six models relating to environmental literacy and pro-environmental behaviour are discussed in chronological order, to indicate the development of theory in this field.

1. early linear models of pro-environmental behaviour (early 1970s), which were soon proved incorrect;
2. important variables associated with environmental literacy by Hungerford and Tomera (1985);
3. the theory of planned behaviour (TPB) by Ajzen (1985), who considered behavioural intentions as central to understanding pro-environmental behaviour;
4. the model of responsible environmental behaviour by Hines, Hungerford and Tomera (1987), pioneers in the environmental education field;
5. the model of environmental citizenship behaviour by Hungerford and Volk (1990), incorporating three categories of variables, namely entry-level, ownership, and empowerment variables; and
6. the environmental literacy framework of Marcinkowski and Rehring (1995), outlining the major components of environmental literacy.

2.5.1 Early linear models of pro-environmental behaviour (early 1970s)

Early models and traditional thinking on pro-environmental behaviour supported a linear relationship among knowledge, attitude and action variables in the behavioural change process (Culen, 2001; Erdoğan, 2009:48; Hsu, 2004:38; Kollmuss & Agyeman, 2002:241; Ramsey & Rickson, 1976). Figure 2.9 illustrates the linear relationship of the "knowledge-attitude-behaviour" theory (Hsu, 2004:38), also referred to as the "behavioural change system" (Hungerford & Volk, 1990:9).

Source: Hungerford and Volk (1990:9)

Figure 2.9: Linear relationship in early models of pro-environmental behaviour

It was postulated in the linear model of pro-environmental behaviour (Figure 2.9), that increased environment knowledge would lead to developing environmental awareness or attitudes, which in turn was thought to lead to pro-environmental behaviour (Hsu, 2004:38; Kollmuss & Agyeman, 2002:241; Ramsey & Rickson, 1977). These rationalist models assumed that educating people about environmental issues would automatically result in more pro-environmental behaviour (Hsu, 2004:38; Kollmuss & Agyeman, 2002:241). However, research showed that increases in knowledge and awareness does not necessarily lead to pro-environmental behaviour (Hungerford & Volk, 1990; Sia, Hungerford & Tomera, 1986), suggesting a discrepancy or gap between attitude and behaviour (Kollmuss & Agyeman, 2002:241).

Ajzen and Fishbein (1980) addressed these issues of measurement discrepancies in their theory of reasoned action and their theory of planned behaviour (Ajzen & Fishbein, 1980; Fishbein & Ajzen, 1975). These authors suggest that, attitudes do not determine behaviour directly, but rather influence behavioural intentions, which in turn shape our actions or behaviour (Kollmuss & Agyeman, 2002:241). Detail on the TPB by Ajzen (1985) follows in 2.5.3.

2.5.2 Important variables associated with environmental literacy by Hungerford and Tomera (1985)

Hungerford and Tomera (1985) proposed a model for environmental literacy, reflecting both the research base and the goal structure of environmental education (Hsu, 1997:6, UNESCO, 1978:15). Figure 2.10 illustrates the eight important variables associated with Hungerford and Tomera's (1985:214) model for environmental literacy.

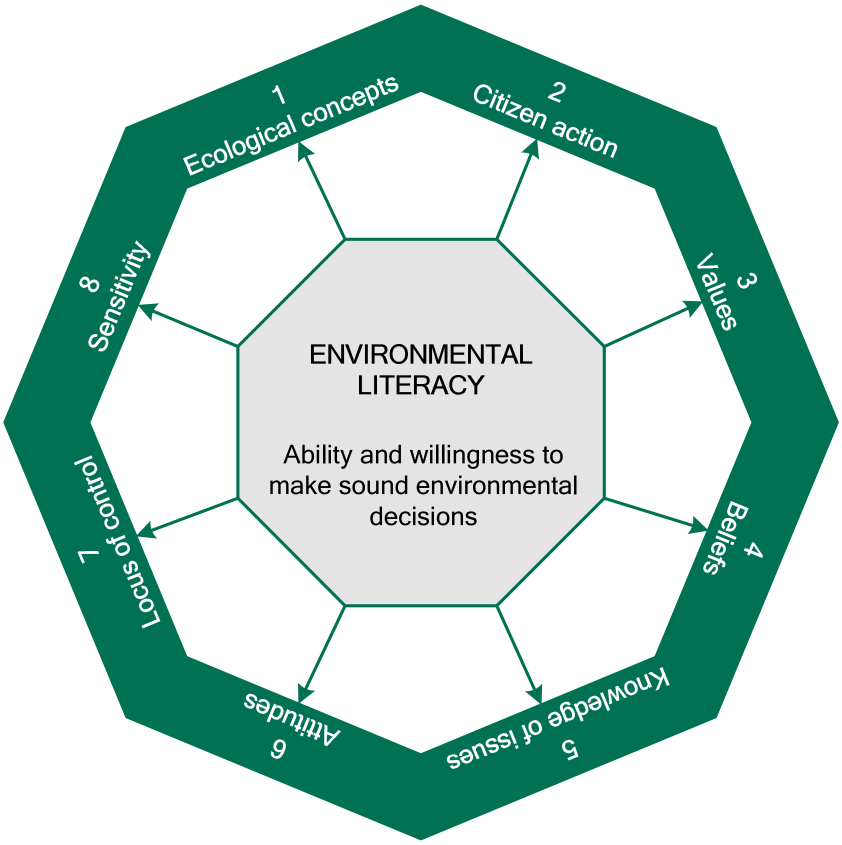


Figure 2.10: Eight important variables associated with environmental literacy

Source: Hungerford and Tomera (1985:214)

Figure 2.10 shows how each of the eight environmental literacy variables interacts with all the others. These interactions were tested by Sia (1984), and Sivek and Hungerford (1990). The results of both of these studies indicated that the eight variables drawn from the Hungerford and Tomera (1985) model of environmental literacy could serve as a valuable source regarding the predictors of pro-environmental behaviour (Hsu, 1997:8).

2.5.3 Theory of planned behaviour by Ajzen (1985)

The theory of planned behaviour (TPB), developed in the 1980s (Ajzen, 1985), was based on the assumption that some conscious reasoning is involved in the formation of intentions to perform a behaviour, and that this behaviour is at least partly under the control of the individual. According to Levine and Strube (2012:311), most of the research that has attempted to trace the paths of influence between attitudes and behaviour has been guided by the TPB (Ajzen, 1985; 1991).

The TPB suggests that behavioural intention is the crucial antecedent to behaviour and that attitudes affect behaviour to the extent that they influence intentions. The TPB argues that many of the factors that predict behaviour do so indirectly by first influencing intentions (Levine & Strube, 2012:311). In the context of pro-environmental behaviour, Kaiser and various colleagues have found substantial support for the TPB proposition regarding the mediational role of intentions (e.g. Hübner & Bogner, 2005; Kaiser, Kaiser & Gutscher, 2003; Kaiser, Ranney, Hartig & Bowler, 1999; Kaiser & Schultz, 2009; Kaiser, Wölfing & Fuhrer, 1999). Furthermore, support has been provided for the efficacy of the TPB components to explain a wide range of intentions and behaviours, including those relating to the environment (e.g. Bamberg, Ajzen & Schmidt, 2003; Bamberg & Möser, 2007:16; Knussen, Yule, MacKenzie & Wells, 2004:237). Figure 2.11 illustrates the TPB in the context of the present study.

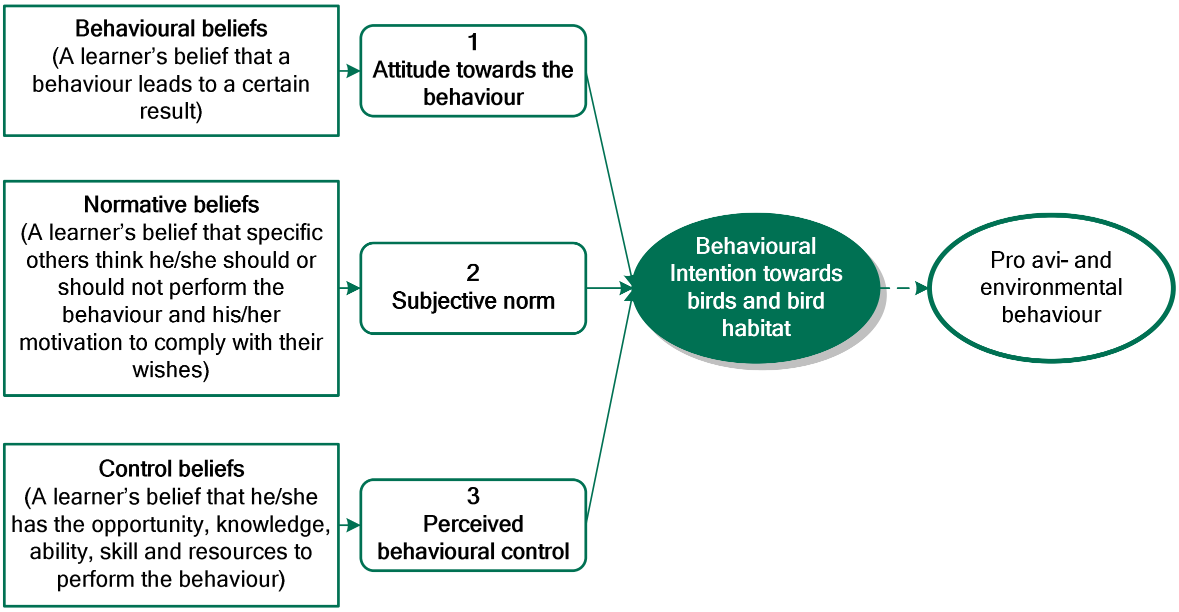


Figure 2.11: Theory of planned behaviour (TPB)

Source: Adapted from: Brown, Ham and Hughes (2010:883)

As illustrated in Figure 2.11, behaviour is predicted by (1) attitudinal factors, (2) subjective norms, and (3) perceived behavioural control, not directly, but mediated by behavioural intentions. Attitudes reflect the evaluation of the behaviour and its outcome, while the subjective norms reflect the extent to which people important to the individual are perceived to support the behaviour, and the extent to which the individual is motivated to comply or conform (Knussen *et al*. 2004:237). Perceived behavioural control reflects the extent to which the individual feels able to perform the behaviour (Knussen *et al*., 2004:237).

Based on Ajzen and Fishbein's (1980) TPB, Hines *et al.* (1987), propose a model of responsible environmental behaviour, which is based on a meta-analysis that provided a synthesis of research that was conducted on responsible environmental behaviour (pro-environmental behaviour).

2.5.4 Model of responsible environmental behaviour by Hines, Hungerford and Tomera (1978)

Hines *et al*. (1987) proposed the model of responsible environmental behaviour. According to Hines *et al*. (1987:6), knowledge alone is not sufficient to lead to action; the individual must also possess a desire to act in an environmentally friendly manner. One's desire to act appears to be influenced by a number of personality characteristics (for example, the locus of control and personal responsibility), including positive attitudes toward the environment. Furthermore, if the ability to act is also present, action will likely follow (Hines *et al*., 1987:7). Figure 2.12 illustrates the model of responsible environmental behaviour.

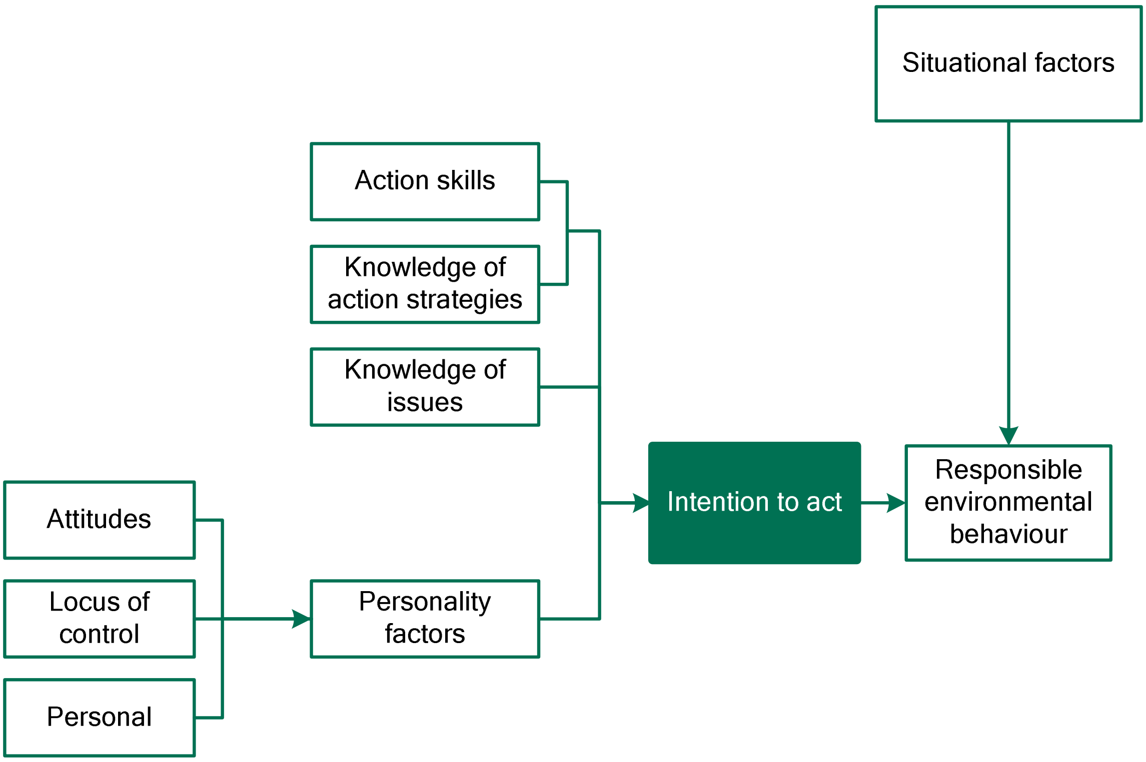


Figure 2.12: Model of responsible environmental behaviour (pro-environmental behaviour)

Source: Hines *et al*. (1987)

In their proposed model of responsible environmental behaviour, Hines *et al*. (1987) suggest that behavioural intentions are direct determinants of pro-environmental behaviour, evident in Figure 2.12. '*Intention to act*' (behavioural intention) is viewed as summarising the interplay of cognitive (action skills, knowledge of action strategies and issues) as well as personality variables (attitudes, the locus of control, and personal responsibility) (Hines *et al*., 1987:6). According to these authors, an individual who expresses an intention to take action will be more likely to engage in the action than will an individual who expresses no such intention (Hines *et al*., 1987:4). There seems to be many more factors that influence pro-environmental behaviour (Kollmuss & Agyeman, 2002:241). Hines *et al*. (1987) call these ‘situational factors’, which include economic constraints, social pressures, and opportunities to choose different actions.

Although the model of Hines *et al*. (1987) is more sophisticated than the model by Ajzen and Fishbein (1980), the factors identified (as illustrated in Figure 2.12 above) according to their results, do not sufficiently explain pro-environmental behaviour. The results of their study indicated weak relationships between knowledge and attitudes, attitudes and intentions, and intentions and actual responsible behaviour (Kollmuss & Agyeman 2002:244). However, during the decade thereafter, the meta-analysis conducted by Hines *et al*. exerted a strong influence on the further research on psychosocial determinants of pro-environmental behaviour. Hungerford and Volk (1990) incorporated Hines *et al*.’s (1987) determinants in their model of environmental citizenship behaviour, and this model is discussed next.

2.5.5 Model of environmental citizenship behaviour of Hungerford and Volk (1990)

Hungerford and Volk’s (1990) model of environmental citizenship behaviour incorporates three levels of variables that ultimately influence pro-environmental behaviour in a sequential fashion, as shown in Figure 2.13.

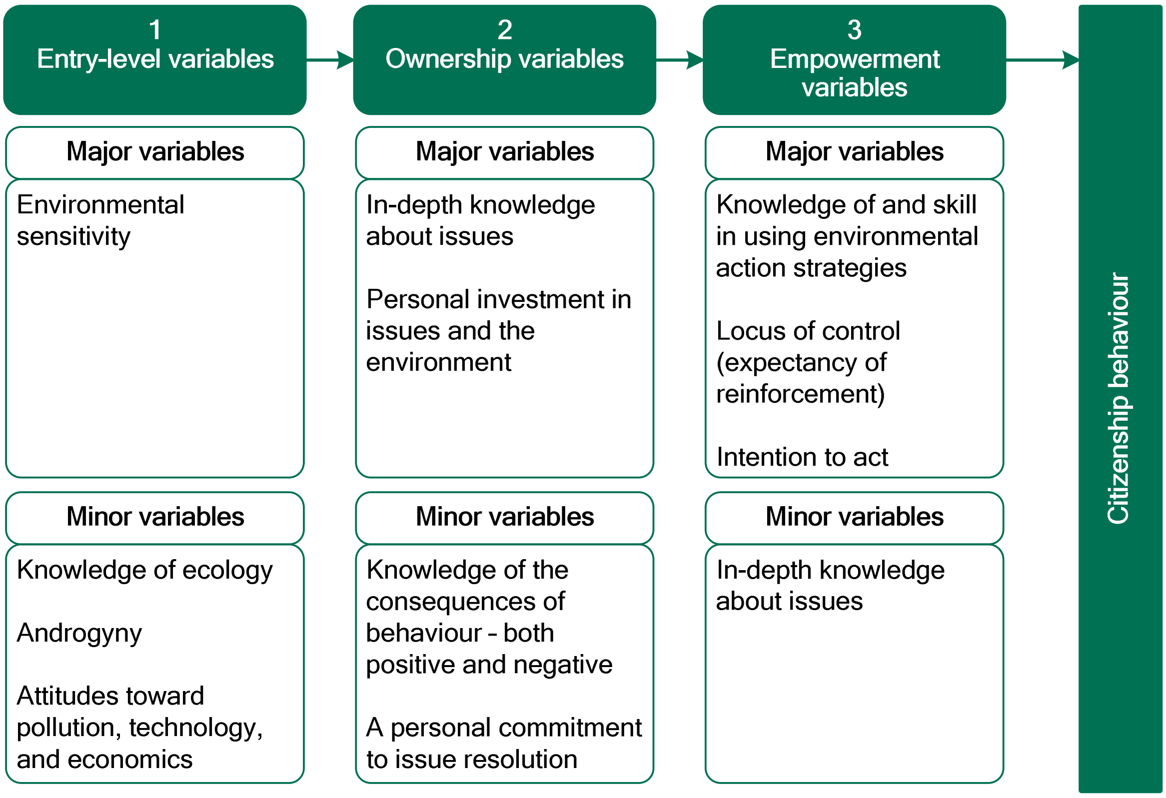


Figure 2.13: Major and minor variables involved in environmental citizenship behaviour

Source: Hungerford and Volk (1990:11)

As illustrated in Figure 2.13, the entry-level variables (1), such as environmental sensitivity and knowledge of ecology, serve as prerequisites that would "enhance a person's decision-making, once an action is undertaken" (Hungerford & Volk, 1990:11). Ownership variables (2), comprising the second level, create a sense of accountability and ownership among individuals of a particular environmental issue. Such feelings of ownership are enhanced through in-depth knowledge and personal investment in an issue. At the third level, empowerment variables (3) provide an individual with a sense that they can make a difference as it relates to a particular environmental issue (Hungerford & Volk, 1990:11). The environmental literacy framework (Marcinkowski & Rehring, 1995) that follows includes the goals, objectives and key characteristics of environmental education and incorporates the predictors of pro-environmental behaviour.

2.5.6 Environmental literacy framework of Marcinkowski and Rehring (1995)

After review and validation of the environmental literacy concept by a diverse panel (Marcinkowski & Rehring, 1995), the Environmental Literacy Consortium, proposed an environmental literacy framework. The framework was designed to reflect on historical definitions, research, evaluation and the significant learning outcomes of environmental education (Hsu, 1997:11). Figure 2.14 illustrates the environmental literacy framework.

1
Cognitive dimensions (knowledge and skills)

- knowledge of ecological and socio-political foundations
- knowledge of and ability to identify, analyse, investigate and evaluate environmental problems and issues
- knowledge of and ability to apply environmental action strategies seeking to influence outcomes on environmental problems and issues
- ability to develop and evaluate an appropriate action plan for the resolution of environmental problems or issues

2
Affective dimensions

- recognition of the importance of environmental quality and the existence of environmental problems and issues
- empathic, appropriate and caring attitude toward the environment
- willingness to work toward the prevention and/or remediation of environmental problems and issues

3
Additional determinants of environmental responsible behaviour

- belief in their ability, both individually and collectively, to influence outcomes of environmental problems and issues
- assumption of personal responsibility for personal actions that influence the environment

4
Personal and/or group involvement in environmental responsible behaviour

- ecomanagement
- economic / consumer action
- persuasion
- political action
- legal action

Figure 2.14: Environmental literacy framework

Source: Marcinkowski and Rehring (1995)

As is evident from Figure 2.14, the environmental literacy framework consists of four categories reflecting the cognitive, affective and action components of environmental literacy. The framework includes the goals, objectives and key characteristics of environmental education (Roth, 1992; UNSECO, 1978) and incorporates the predictors of pro-environmental behaviour (Hines *et al*., 1987:7; Hungerford & Volk, 1990:11).

To synthesise, the six models relating to environmental literacy and environmental behaviour, presented in section 2.5, were examined to determine environmental literacy components that would lead to or result in pro-environmental behaviour. These models were investigated to assist with the development of the conceptual framework for the present study (*Phase 2* of the methodological procedure in Figure 1.2), and thus serve as a background and foundation from which the present study was built. The importance and relevance of each model for the present study are summarised below.

1. Early linear models of pro-environmental behaviour of the early 1970s which depicted the linear relationship of the 'knowledge-attitude-behaviour' theory (section 2.5.1) was proven incorrect, since increases in knowledge and attitudes do not necessarily lead to pro-environmental behaviour, suggesting a gap between attitude and behaviour. The present study, as suggested in the theory of planned behaviour (Fishbein & Ajzen, 1975; Ajzen & Fishbein, 1980), included behavioural intention to address the gap between attitude and behaviour (section 2.5.3). Attitudes do not determine behaviour directly, but rather influence behavioural intentions, which in turn shape behaviour.

2. The important variables associated with environmental literacy by Hungerford and Tomera (1985). The eight variables of this model proved to be valuable in predicting pro-environmental behaviour. For the present study, the Hungerford and Tomera model of environmental literacy provided evidence to support the selection of the environmental and avitourism literacy components (section 2.4.3) included in the 'conceptual literacy framework for avitourism' (see Figure 3.1).

3. The theory of planned behaviour by Ajzen (TPB) (1985): since the TPB attempts to address the gap between attitude and behaviour and consider behavioural intentions central to understanding behaviour, the present study incorporated behavioural intention as a component in the 'conceptual literacy framework for sustainable avitourism' (see Figure 3.1).
4. The model of responsible environmental behaviour by Hines *et al*. (1987): this model applies the TPB, as explained above, in the environmental education field. In their model, behavioural intention is viewed as summarising the interplay of cognitive (i.e. knowledge) as well as personality variables (i.e. attitudes). The present study incorporated behavioural intention in the conceptual framework and applied the TPB to the tourism management field.
5. The model of environmental citizenship behaviour by Hungerford and Volk (1990). This model incorporates three categories of variables, namely entry-level, ownership, and empowerment variables that ultimately influence pro-environmental behaviour in a sequential fashion. The present study incorporated components from each of the three categories of variables from Hungerford and Volk's model, also in a sequential fashion.
6. The environmental literacy framework of Marcinkowski and Rehring (1995), outlining the major components of environmental literacy: this framework consists of four (see Figure 4.14) components reflecting the three cognitive, affective and action categories of environmental literacy; includes the goals, objectives and key characteristics of environmental education; and incorporates the predictors of pro-environmental behaviour. Following the framework of environmental literacy, the present study incorporated the environmental literacy components into the conceptual framework that reflects on the cognitive, affective and action categories of environmental literacy. The present study also included the goals, objectives and key characteristics of environmental education and incorporated the predictors of pro-environmental behaviour.

The environmental behaviour models and the environmental literacy frameworks are related and build upon one another. Furthermore, one may find that there is considerable similarity among the variables or components in the environmental behaviour models (Hungerford & Volk, 1990; Hines *et al*., 1987) and the environmental literacy frameworks (Marcinkowski & Rehring, 1995; Hungerford & Tomera, 1985).

Since the present study focused specifically on birds and the natural environment in which birds live, the following 'environmental and avi-literacy' components were included in the 'conceptual literacy framework for avitourism': environmental and avi-orientation (including awareness and affinity), environmental and avi-knowledge, environmental and avi-values, behavioural intentions, and actual pro-environmental and avi-behaviour. These components were taken from the environmental education, environmental literacy and/or environmental psychology domains and applied to the context of the present study, thus contributing to the body of knowledge in the field of tourism management.

2.6 CONCLUSION

Chapter 2 comprised the first part of the secondary research, namely the literature review conducted for the present study (*Phase 1* of the methodological procedure in Figure 1.2). A variety of sources of information were used to reach the first secondary objective, namely –

> To explore mechanisms and approaches aimed at facilitating behavioural change among secondary school learners towards birds and the natural environment.

In addition, the existing literature from the environmental education and environmental literacy domains was consulted to achieve the first part of the second secondary objective, namely –

> To conceptualise 'sustainable avitourism' and 'environmental and avitourism literacy' from existing literature.

The structure of this chapter was outlined in Figure 2.1. The flow process addressed the growth in tourism, leading to a discussion of the need for more sustainable practices in the development and management of tourism.

Avitourism, a niche tourism market, has become an increasingly popular mechanism through which to integrate economic, social and environmental sustainability. Sustainable avitourism was therefore conceptualised and the various stakeholders in the avitourism arena, responsible to apply the sustainability principles, was discussed (see section 2.3). It was also indicated that sustainable avitourism is dependent on the natural resource base, which is increasingly placed under pressure. The literature review highlighted the key role of education as our best hope to solve the current and emerging environmental problems. The potential of environmental literacy as a vehicle to realise the educational agenda of sustainable development was therefore emphasised.

For the purpose of this study, the term ‘environmental literacy’ was taken from the environmental education domain, and was applied to the context of birds and the natural environment in which birds live. A definition of ‘environmental and avitourism literacy’ was developed (see section 2.4.2), which did not only provide background and context for the present study, but also assisted to operationalise and transform the concept into an instrument that would measure the underlying categories and components of environmental and avitourism literacy. The operational definitions developed for the present study, were taken from the environmental education, environmental literacy and/or environmental psychology domains and applied to the context of the present study, thus contributing to the body of knowledge in the field of tourism management. The categories and components of environmental and avitourism literacy was discussed and analysed under section 2.4.3.

Chapter 2 further highlighted pro-environmental behaviour to be a core component and the ultimate expression of environmental and avitourism literacy. Six models relating to environmental literacy and environmental behaviour, building upon the definitions and theory, were therefore discussed and critically analysed in section 2.5.

The literature review conducted in Chapter 2 aimed towards the development of a conceptual framework for sustainable avitourism. To synthesise, the following secondary literature was considered (from the literature review), to compile the conceptual literacy framework for sustainable avitourism:

- the four strands of environmental literacy suggested by Roth (1992:9): knowledge, skills, affect and behaviour were considered to make a strong contribution to develop environmental and avitourism literacy (section 2.4.2);
- the definition that was developed for ‘environmental and avitourism literacy’ (section 2.4.2);
- the components chosen for the present study represented each of the categories of environmental literacy, namely cognitive, affective and action (section 2.4.3);
- the components used in the present study were based on the environmental education objectives of the Tbilisi Declaration (UNESCO, 1978:15), which were also incorporated into the environmental literacy ladder (Elder, 2003:16) (section 2.4.3);
- the TPB (Ajzen, 1985), which considers behavioural intention as central to understanding pro-environmental behaviour. The present study therefore incorporated behavioural intention as a component in the conceptual literacy framework for sustainable avitourism, since according to the TPB, attitudes do not determine behaviour directly, but rather influence behavioural intentions, which in turn shape behaviour (section 2.5.3); and
- the environmental literacy variables used in the environmental behaviour models (Hines *et al*., 1987; Hungerford & Volk, 1990) and the environmental literacy frameworks (Marcinkowski & Rehring, 1995; Hungerford & Tomera, 1985) presented here were examined and considered in the development of the conceptual framework of the present study (section 2.5).

The ‘conceptual literacy framework for sustainable avitourism’ developed for the present study (*Phase 2* of the methodological procedure in Figure 1.2) is presented and discussed in Chapter 3, building upon the secondary literature examined in Chapter 2.

CHAPTER 3: A CONCEPTUAL LITERACY FRAMEWORK FOR SUSTAINABLE AVITOURISM

3.1 INTRODUCTION

The previous chapter (Chapter 2) addressed *Phase 1* of the methodological procedure, comprising the first part of the secondary research, namely the literature review (see Figure 1.2). In *Phase 2*, based on the literature review performed in *Phase 1*, a conceptual literacy framework for sustainable avitourism was developed and is presented and discussed in Chapter 3 (see Figure 2.1 indicating the flow of the secondary research of the present study). This relates to the third secondary objective, namely –

> To develop a conceptual literacy framework aimed at facilitating behavioural change within secondary school learners' behaviour towards birds, the natural environment and avitourism.

Figure 3.1 represents the 'conceptual literacy framework for sustainable avitourism' developed for the present study.

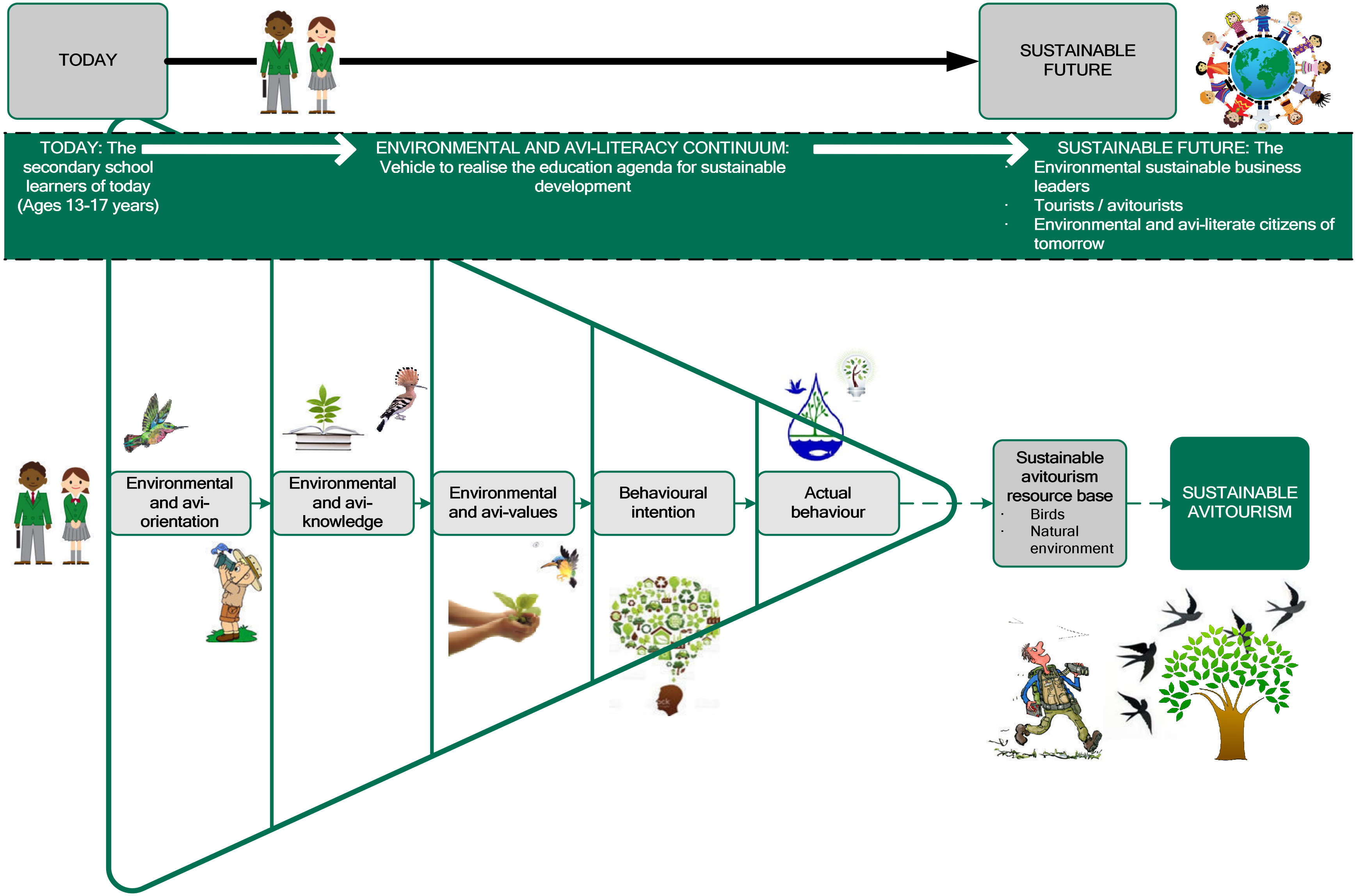


Figure 3.1: Conceptual literacy framework for sustainable avitourism

The main idea or thinking regarding the conceptual literacy framework for sustainable avitourism, in Figure 3.1, is that the secondary school learner of today influences the future state of the natural environment. If learners could go through a process of education that would enhance pro-environmental and avi-behaviour then these changed behaviours would lead to the sustainability of birds and the natural environment, and ultimately sustainable avitourism.

Secondary literature from both environmental education and environmental literacy domains was examined (see the literature review in Chapter 2), to compile the conceptual literacy framework for sustainable avitourism. The four strands of environmental literacy suggested by Roth (1992:9) are knowledge, skills, affect and behaviour. These were considered to make a strong contribution to develop environmental and avitourism literacy (section 2.4.2). In addition, the environmental education objectives (i.e. awareness, knowledge, attitudes, skills and participation) highlighted in the Tbilisi Declaration were incorporated into the conceptual literacy framework for avitourism (UNESCO, 1978:15) (section 2.4.3). Furthermore, these components are embedded in the categories of environmental literacy, namely –

- cognitive (avi-awareness, bird and environmental knowledge);
- affective (avi-affinity, environmental and avi-values, behavioural intention); and
- action (actual pro-environmental and avi-behaviour) (section 2.4.3).

The six models relating to environmental literacy and environmental behaviour, discussed in section 2.5, also play an important role in developing the conceptual literacy framework for sustainable avitourism. In this regard, the TPB (Ajzen, 1985) considered behavioural intention as a crucial antecedent to behaviour and central to understanding pro-environmental behaviour. According to the TPB, behaviour is therefore predicted by various factors (e.g. attitudes and values), not directly, but mediated by behavioural intentions (section 2.5.3). Based on the TPB, the present study has therefore incorporated 'behavioural intention towards birds, the natural environmental and avitourism' in the conceptual literacy framework for sustainable avitourism.

Furthermore, the environmental literacy components used in the environmental behaviour models (Hines *et al*., 1987; Hungerford & Volk, 1990) and the environmental literacy frameworks (Hungerford & Tomera, 1985; Marcinkowski & Rehring, 1995) reported in Chapter 2 (section 2.5) were examined and considered in the development of the conceptual framework of the present study. The importance and relevance of each model for the present study were summarised at the end of 2.5.

The conceptual framework illustrated in Figure 3.1 outlines the five essential components of the environmental and avitourism literacy continuum, namely:

- environmental and avi-orientation (including awareness and affinity);
- bird and environmental knowledge;
- environmental and avi-values;
- behavioural intentions; and
- actual pro-environmental and avi-behaviour.

These components were based on environmental literacy in general, and were adapted for the context of this study, focusing specifically on birds and the environment in which birds live. The components are presented as an environmental and avitourism literacy continuum, i.e. the components in the conceptual framework represent stepping-stones to prepare and enable secondary school learners to become actively involved in the conservation and sustainability of birds and the natural environment in which birds live.

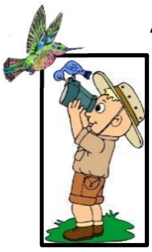
Each of the five environmental and avitourism-literacy components as illustrated in Figure 3.1 is conceptualised in the sections that follow (3.2–3.6). Although not described as a component of the environmental and avitourism literacy continuum, a sixth component, namely behavioural involvement, was added to determine the secondary school learners' current level of involvement in birding and avitourism and this is described in section 3.7. Sections 3.2–3.6 relate to the second secondary objective, namely –

> To conceptualise sustainable avitourism, environmental and avitourism literacy, environmental and avi-orientation, environmental and avi-knowledge, environmental and avi-values, behavioural intention, actual pro-environmental and avi-behaviour and involvement in avitourism from existing literature.

'Sustainable avitourism' and 'environmental and avitourism literacy' were addressed in sections 2.4 and 2.5 respectively.

The first of the five components of the 'conceptual literacy framework for sustainable avitourism', namely 'environmental and avi-orientation' is discussed next.

3.2 CONCEPTUALISATION OF ENVIRONMENTAL AND AVI-ORIENTATION



As the first component of the conceptual literacy framework for sustainable tourism (see Figure 3.1), environmental and avi-orientation is discussed as the entry level of the environmental and avitourism literacy continuum.[22] Citizens at nominal level (entry level), as suggested by Roth (1992:16), are developing an awareness and sensitivity towards the environment along with an attitude of respect for natural systems and concern for the nature and magnitude of the human influences on these systems (Loubser *et al.*, 2001:319; Roth, 1992:16).

An understanding of a learner's environmental orientation is of critical importance as opportunities for authentic contact diminish (Larson, Green & Castleberry, 2011:72). One of the major objectives of environmental education is the acquisition of environmental awareness, that is "to help social groups and individuals acquire an awareness and sensitivity to the total environment and its allied problems" (Leou, 2005; UNESCO, 1978). According to Larson, Green and Castleberry (2011:72), learners' perceptions of nature, that is, their orientation towards nature, are reflected in their awareness and affinity towards nature.

An improved understanding of learners' environmental and avi-orientation is necessary to identify education priorities that could eventually translate into action for bird conservation (Larson, Green & Castleberry, 2011:73; Leeming *et al.*, 1995). Environmental and avi-orientation in the context of this study is defined next.

3.2.1 Defining environmental and avi-orientation

Environmental orientation (see section 1.5.4) is described as people's "perceptions of nature" and the ways in which people "perceive the natural world" (Larson, Green & Castleberry, 2011:72). Two distinct components of environmental orientation were

[22] Environmental and avitourism literacy is a continuum of competencies ranging from zero competency to very high competency (adapted from Roth, 1992:16) (detail was provided in 2.4.3).

identified by Larson, Green and Castleberry (2011:72), namely eco-awareness and eco-affinity.

In general, 'awareness' is defined as holding a "general impression, or consciousness about something" (Elder, 2003:16). According to Larson, Green and Castleberry (2011:83), eco-awareness items reflect a cognitive grasp of environmental issues related to the general importance and sustainability of natural ecosystems.

The Oxford English Dictionary (N.d.) defines affinity as "a natural liking for and understanding of someone or something" which can be expressed as "a similarity of characteristics suggesting a relationship, especially a resemblance in structure between animals and plants". Eco-affinity refers to "a personal interest in nature" (Larson, Green & Castleberry, 2011:83) or "an environmental interest" (Ballantyne *et al*., 2011:1248). Based on the results of the study by Larson, Green and Castleberry (2011:83), the identification of eco-affinity appeared to capture a unique aspect of learners' environmental orientation and should be considered in addition to awareness when assessing learners' propensity to adopt a conservation-based mind-set.

Together, the two components (eco-awareness and eco-affinity) represented environmental orientation, which encompassed elements of ecological appreciation and environmental concern (Eagles & Demare, 1999; Kellert, 2002; Larson, Green & Castleberry, 2011:72;). Therefore, both cognitive (eco-awareness) and affective (eco-affinity) components are embedded in environmental orientation (Larson, Green & Castleberry, 2011:73).

For the purposes of this study, the term 'environmental orientation' was taken and applied to the context of birds and the natural environment in which birds live. In summary, 'environmental and avi-orientation' refers mainly to:

- ways in which learners perceive the natural world, more specifically birds and the natural environment in which birds live;
- avi-affinity and avi-awareness components, where 'avi-affinity' refers to natural liking or attraction and personal interest in birds and the natural environment; while
- 'avi-awareness' refers to a cognitive grasp of environmental issues related to the general importance and sustainability of birds in their natural ecosystems.

For the purpose of this study, 'avi-awareness' reflects a general impression, or consciousness about the general importance and sustainability of birds and their natural habitat. In turn, 'avi-affinity' is defined as a natural inclination or attraction to something and reflects personal interest in birds and their natural habitat. These terms are collectively referred to as 'environmental and avi-orientation', which is defined as the way in which an individual perceive the natural world, reflected in the general impression, consciousness about the importance and personal interest in birds and the natural environment in which birds live.

To measure an environmental orientation amongst secondary school learners in the present study, the general environmental orientation scales were investigated, and are reported on in the next section.

3.2.2 The measurement of environmental and avi-orientation

For the purpose of this study, the measuring instrument of Larson, Green and Castleberry (2011:72) was adopted. These authors' study employed a mixed-methods approach that included pilot tests, final survey implementation, and interviews to create a survey instrument for assessing the environmental orientation, which specifically grasps the eco-awareness and eco-affinity of children (Larson, Green & Castleberry, 2011:72). The Children's Environmental Perceptions Scale (CEPS) was chosen to measure environmental and avi-orientation for the present study (section 4.4), since it appeared to be psychometrically sound and proved to be a faster and an efficient method for measuring the environmental affinity and awareness of learners accurately (Larson, Green & Castleberry, 2011:81). In addition, the content validity of the two component model (CEPS) was verified, as items within each factor were meaningful, logical, and interpretable (Larson, Green & Castleberry, 2011:81). According to Larson, Green and Castleberry (2011:73), this evaluation tool may assist educators and researchers to examine the ways learners perceive the natural world, which was particularly useful for the present study.

Developing environmental affinity and avi-knowledge requires more than a general awareness, consciousness and interest in the environment. It requires an understanding and comprehension of human and natural systems and processes (Elder, 2003:16). The second component of the conceptual literacy framework for sustainable avitourism (see Figure 3.1), namely 'environmental and avi-knowledge' of secondary school learners, is discussed next.

3.3 CONCEPTUALISATION OF ENVIRONMENTAL AND AVI-KNOWLEDGE

Consideration for the environment could come only from well-informed citizens, who are aware of and fully committed to their rights to a quality environment (Haron *et al*., 2005:427). Environmental knowledge is one critical component to create a citizenry equipped to tackle current and emerging environmental issues worldwide (Stevenson, Peterson, Bondell, Mertig & Moore, 2013:1). One of the major objectives of environmental education is the acquisition of environmental knowledge, which means "to help social groups and individuals gain a variety of experiences in, and acquire a basic understanding of the environment and its associated problems" (Leou, 2005; UNESCO, 1978:15).

The discussion of 'environmental and avi-knowledge' is outlined in three subsections, namely, defining environmental knowledge (section 3.3.1), followed by a summary of studies related to measuring environmental knowledge (section 3.3.2). This section concludes with a synthesis of the findings from secondary literature on environmental knowledge (section 3.3.3).

3.3.1 Defining environmental and avi-knowledge

Various definitions or descriptions of environmental knowledge (see section 1.5.5) were found in literature. Environmental knowledge is defined as "individuals' familiarity with facts, information and principles relating to environmental sustainability" (Ramsey & Rickson, 1976; Wiernik *et al*., 2013:831). According to Zsóka *et al*. (2013:127), environmental knowledge is "knowledge and awareness about environmental problems and possible social solutions to those problems". Haron *et al*. (2005:427) define environmental knowledge as "one's ability to understand and evaluate the influence of society on the eco-system". Furthermore, environmental knowledge can be demonstrated through citizens' ability to recognise environmental problems, and the causes and consequences of such problems, including facts and concepts necessary for explanation (Haron *et al*., 2005:427).

For the purposes of this study, the term 'environmental knowledge' was taken from the environmental education and environmental literacy domain and applied to the context of birds and the natural environment in which birds live. In summary, “environmental and avi-knowledge” referred mainly to:

- individuals’ familiarity with facts, information and principles relating to the sustainability of birds and the natural habitat in which birds live;
- knowledge and awareness about and causes of environmental problems that might affect birds and their natural habitat, and possible social solutions to those problems; and
- one’s ability to understand and evaluate the influence of society on the eco-system in which birds live.

Based on the above, the definition of environmental and avi-knowledge is that it is

> An individual’s knowledge and ability to understand and evaluate the facts, information and principles relating to the sustainability of birds and the natural habitat in which birds live; the causes of environmental problems affecting birds and bird habitat, and possible social solutions to these environmental problems.

To measure the ‘environmental and avi-knowledge’ amongst secondary school learners in the present study (section 4.4), the general environmental knowledge scales found in the environmental education and/or environmental literacy domains had to be investigated. The measurement scales used to measure environmental knowledge are discussed in the next section.

3.3.2 The measurement of environmental knowledge

Developing environmental knowledge is crucial to informed and systematic sustainable decision-making (Bögeholz, 2006:79). Therefore, various studies have reported findings related to environmental knowledge (Alp, Ertepinar, Tekkaya & Yilmaz, 2006:213; Bögeholz, 2006:74; Coyle, 2005:98; Culen & Mony, 2003:26; Duerden & Witt, 2010:383; Frick, Kaiser & Wilson, 2004:1603; Haron *et al*., 2005:429; Leeming *et al*., 1995:5; Levine & Strube, 2012:315; McBeth & Volk, 2010:56; Meinhold & Malkus, 2005:520; Stevenson *et al*., 2013:3; Zsóka *et al*., 2013:127). The main findings related to the measurement scales used to measure environmental knowledge by these 13 studies are summarised, in chronological order. Table 3.1 outlines the author, the measurement scale, the population or sample used in their study, and an example of the type of questions/items used in their measurement scale.

Table 3.1: Summary of scales measuring environmental knowledge

Author	Measurement scale	Population /sample	Type of questions or items	Examples of items
Stevenson *et al.* (2013)	MSELS	Middle school learners in North Carolina, USA (ages 11–15 years)	Multiple-choice items	E.g. A small bird eats a butterfly that has been eating some nectar from a flower. Then the bird is eaten by a hawk. This is an example of: a) Mutualism b) A food chain c) Competition d) Survival of the fittest
Zsóka *et al*. (2013)	Listing environmental problems	University students (ages 18–24) and high school learners (age 14–18) in Hungary	Provide a list	E.g. List environmental problems such as water pollution, climate change, air pollution and biodiversity loss
Levine and Strube (2012)	NEETF/Roper survey	University students in Washington USA.	Multiple-choice items	E.g. There are many different kinds of animals and plants, and they live in many different types of environments. What is the word used to describe this idea? It is … a) Multiplicity b) Biodiversity c) Socio-economics d) Evolution e) Don't know
Duerden and Witt (2010)	Developed a 5-item scale	Middle (ages 11–14) and high school learners (ages 14–18) in the USA	5-point Likert response format, ranging from very untrue (1) to very true (5)	-
McBeth and Volk (2010)	MSELS	Middle grade learners (ages 11–15 years) in the USA	Multiple-choice items	E.g. A grassland turns into a desert. What will most likely happen to the animals that lived in the grassland? a) Most will leave or die b) They would have more babies to survive c) Those that eat grass would adapt to new food

Author	Measurement scale	Population /sample	Type of questions or items	Examples of items
				d) Many will pass on traits that would help their young survive in the desert
Alp *et al.* (2006)	Adapted CHEAKS	School learners (ages 11–17) in Turkey	Multiple-choice items	E.g. A species that no longer exists is: 1) protected 2) endangered 3) abundant 4) extinct 5) wild game
Bögeholz (2006)	-	-	-	Dimension types included species knowledge (plants and animals), ecological concepts, action specific environmental knowledge and system knowledge
Coyle (2005)	NEETF/Roper measuring instrument	Adults in the USA	Multiple-choice items	E.g. Where does the most of the garbage in the U.S end up? Is in … a) Oceans b) Incinerators c) Recycling centres, or d) Landfills? e) Don't know
Haron *et al.* (2005)	Developed a 14-item scale	Adults in Malaysia	Open questions and closed questions ('true', 'false' or 'do not know')	E.g. Destruction of the forest will cause biological imbalances (true/false/do not know)
Meinhold and Malkus (2005)	Adapted Young People and the Environment survey	High school learners (ages 14–18) in the USA	Multiple-choice items Identify terms participants were familiar with	-
Frick *et al.* (2004)	Developed three environmental knowledge scales: system knowledge scale, action-	Adults (ages 20–79) in Switzerland	Multiple-choice items and dichotomous true/false statements	E.g. How can the ozone concentration in the summer be lowered? a) By not using solvents b) By not using cars

Author	Measurement scale	Population /sample	Type of questions or items	Examples of items
	related knowledge scale and effectiveness knowledge scale			c) By reducing electricity consumption d) By turning off air conditioning E.g. In recycling, there is no energy loss (true/false)
Culen and Mony (2003)	Adapted Middle School Environmental Literacy Instrument (MSELI)	School learners (ages 11–17) in Florida, USA	Multiple-choice items	E.g. A pollutant gets into an eco-system and kills large numbers of insects. How might this affect the ecosystem? a) Plants are not damaged so it does not affect the ecosystem b) It damages part of the ecosystem so it may affect the whole ecosystem c) It kills only insects so the other animals in the ecosystem stay healthy d) Most animals eat plants so it doesn't affect the ecosystem much.
Leeming *et al.* (1995)	CHEAKS	Elementary (ages 5–10 years) and middle school learners (ages 11–15 years) in USA	Multiple-choice items	E.g. Ecology is the study of the relationship between: 1) different species of animals 2) plants and the atmosphere 3) organisms and their environments 4) man and other animals. 5) man and the environment.

Table 3.1 provides a summary of the scales used to measure environmental knowledge from secondary research. The table was then analysed in order to assist with *choosing* the appropriate scale to use in the present study.

An analysis of the main findings deduced from Table 3.1 is given next.

- The majority of the secondary research on which Table 3.1 reported was conducted in the USA. Research conducted in Switzerland, Turkey and Malaysia was also reported in the table.
- The following measurement scales were applied to measure *environmental knowledge*:

- the knowledge subscale of the MSELS (Culen & Mony, 2003; McBeth & Volk, 2010; Stevenson *et al*., 2013);
- NEETF/Roper survey (Coyle, 2005; Levine & Strube, 2012);
- knowledge subscale of the CHEAKS (Alp *et al*., 2006; Leeming *et al*., 1995);
- an adapted Young People and the Environment survey (Meinhold & Malkus, 2005).

Some authors (Frick *et al*., 2004; Haron *et al*. 2005; Zsóka *et al*., 2013) developed their own study-specific scales.

- From Table 3.1, it is evident that various types of questions were used to measure environmental knowledge. The measurement scales most often used to measure pro-environmental behavioural intentions was the environmental knowledge subscale of the CHEAKS and verbal commitment subscale of the MSELS. These scales used multiple-choice items to capture the knowledge base of participants.
- Also, the measuring scales were applied to various contexts, samples or target groups, including measuring the environmental knowledge of school children including: –
  - primary or elementary school children, ages 5–10 years (e.g. Leeming *et al*., 1995:5);
  - middle school learners, ages 11–15 years (e.g. Stevenson *et al*., 2013:3; Duerden & Witt, 2010:383; McBeth & Volk, 2010:56; Leeming *et al*., 1995:5);
  - high school learners, ages 14–18 years (e.g. Alp *et al*., 2006:213; Culen & Mony, 2003; Duerden & Witt, 2010:383; Leeming *et al*., 1995:5; Meinhold & Malkus, 2005; Zsóka *et al*., 2013);
  - university students (e.g. Levine & Strube, 2012; Zsóka *et al*., 2013); and
  - adults (e.g. Frick *et al*., 2004).

As the target population for the present study comprised secondary school learners (adolescents aged 13–17), the measuring scales that focused on this target group were investigated.

For the present study, measures of environmental knowledge were based on the *knowledge* subscale of the CHEAKS (Leeming *et al*., 1995). The environmental knowledge subscale of CHEAKS is chosen based on the following reasons:

- This measurement instrument was specifically developed for elementary, middle and junior high school learners (Leeming *et al*., 1995), which is corresponding with the target group of the present study, namely secondary school learners in Grades 8, 9 and 10 (junior phase).
- The scale has sound psychometric properties, it proved to be a reliable and valid instrument and can be used in a variety of settings (Leeming *et al*., 1995).

This section provided a summary of the scales used to measure environmental knowledge. Apart from the measurement scales reported in the secondary literature, a synthesis of the findings based on the literature review on environmental knowledge is provided in the section that follows.

3.3.3 Synthesis of the findings from secondary literature on environmental and avi-knowledge

After investigating the secondary literature concerning environmental knowledge, the following was found:

- It is evident that the components used to measure environmental knowledge included species knowledge (plants and animals), ecological concepts, action specific environmental knowledge and system knowledge (Bögeholz, 2006:74), as well as subdomains, such as animals, energy, water, recycling, pollution and other general items (Alp *et al*., 2006:213; Leeming *et al*., 1995:19). In addition, the measuring scales included topics such as biodiversity, pollution, renewable resources, waste management, and animal species (Coyle, 2005:98). These components were used as a guideline to develop the questions used in the present study to measure the youth's knowledge of birds, the natural environment and birding tourism (e.g. species knowledge of birds, ecological concepts related to birds, and how pollution affects birds). Furthermore, the type of questions used to measure environmental knowledge was mostly in a multiple-choice format, followed by dichotomous true/false statements. Consequently, in the present study the multiple-choice response format was chosen to develop questions to test knowledge of birds, the natural environment and birding tourism (refer to section 4.4).
- Moreover, secondary literature reveals relatively low levels of environmental knowledge amongst adults (Coyle, 2005:iv; Frick *et al*., 2004:1609; Haron *et al*.,

2005:435), university students (Levine & Strube, 2012:316) and school learners (Alp *et al*., 2006:214; McBeth & Volk, 2010:61). Coyle (2005:iv) noted that the NEETF/Roper survey indicated low levels of environmental knowledge amongst adults in the USA, while Frick *et al*. (2004:1609) likewise found modest levels of environmental knowledge amongst the Swiss population. Adult Malaysians performed well on basic or general environmental knowledge, but had only a low level of complex environmental knowledge (Haron *et al*., 2005:435). Results of the knowledge test indicate that university students exhibited modest levels of knowledge of environmental issues (Levine & Strube, 2012:316). Similarly, school learners' scores on environmental knowledge reveal relatively low to moderate ecological understanding (Alp *et al*., 2006:214; McBeth & Volk, 2010:61).

- Although the results indicated relatively low levels of environmental knowledge, the literature suggests that participants using environmental education activities, who spent time outdoors or who participated in direct and indirect nature experiences exhibit higher levels of environmental knowledge than those who had not used or participated in any such activities (Culen & Mony, 2003:27; Stevenson *et al*., 2013:8). Results therefore suggest that such activities had a noteworthy influence on environmental knowledge (Duerden & Witt, 2010:385).
- In addition, the assessment of environmental knowledge may assist in producing meaningful programme evaluations that can help guide curriculum development efforts and identify those programmes and activities that are most effective at promoting pro-environmental behaviour (Culen & Mony, 2003:28).
- According to Bögeholz (2006:80), sustainable development does not only require competencies based on environmental knowledge, but also competencies regarding environmental values. In particular, greater self-awareness of personal value systems and a willingness to revise them is required to prepare secondary school learners (13–17 years) for a sustainable lifestyle (Sibbel, 2009:79).

This section outlined the second component of the conceptual framework for sustainable avitourism, namely 'environmental and avi-knowledge'. The *cognitive* category (see Figure 2.9) relating to pro-environmental behaviour was discussed and highlighted the importance of developing environmental knowledge that would encourage well-informed citizens who are able to make educated, sustainable decisions later in life.

However, secondary literature (Sibbel, 2009; Zsóka *et al.*, 2013:128) point out that environmental knowledge on its own were not sufficient for developing pro-environmental attitudes and behaviours. Littledyke (2006) therefore emphasises the need for connecting the cognitive[23] (i.e. facts, knowledge or understanding) and affective[24] (emotion, feelings, values or attitudes) categories (see Figure 2.9) of environmental education to install sustainable behaviour among, in this case, secondary school learners. Consequently, values and attitudes regarding birds and the environment, representing the affective component, are included in the present study.

The third component of the 'conceptual literacy framework for sustainable avitourism' (see Figure 3.1), 'environmental and avi-values' is discussed next.

3.4 CONCEPTUALISATION OF ENVIRONMENTAL AND AVI-VALUES

Several researchers (Kagawa, 2007; Littledyke, 2006; Pedro & Pedro, 2010; Zsóka *et al.*, 2013:136) emphasise the importance of attitudes and values shaping environmental education, which means going beyond the goal of simply providing knowledge to learners, in this case learners in the secondary phase. In general, values are considered crucial for understanding personal attitudes and behaviour (Uitto & Saloranta, 2010:1867). One of the major categories of objectives of environmental education, as highlighted in the Tbilisi Declaration, is the encouragement of environmental attitudes, which means "to help social groups and individuals acquire a set of values and feelings of concern for the environment and the motivation for actively participating in environmental improvement and protection" (UNESCO, 1978:15).

This section commences with section 3.4.1, which contains the definitions or descriptions of environmental attitudes and values, followed by section 3.4.2 which is

[23] *Cognitive skills* include "skills for investigating environmental problems and issues, including identification, analysis, and evaluation; and skills for dealing with action strategies, including their appropriate selection and planning, implementation, and evaluation of discrete action" (Marcinkowski, 1997:168).

[24] *Affective skills* are reflective of "valuing, organising values into system, integrating values into a world view of ethics, and acting according to these" (Marcinkowski, 1997:168).

a summary of studies measuring environmental attitudes and values. The various scales used to measure environmental attitudes and values are then analysed to assist with choosing the most appropriate scale to be used in the current study. The section concludes with section 3.4.3 which is a synthesis of the main findings from the secondary literature pertaining to environmental attitudes and values.

3.4.1 Defining environmental and avi-values

Various terms, definitions or descriptions of environmental attitudes and values were reported in secondary literature. Generally, attitudes and values, where researchers examine personal values, wants and needs pertaining to the natural environment have been grouped as one concept (Igbokwe, 2012:651; Marcinkowski, 1997:168). Research by Marcinkowski (1997:168) categorises affective dispositions of environmental education under environmental sensitivity, a set of *values*, a feeling and *attitude* of concern, and the motivation to participate actively in environmental improvement. According to the same author, environmental attitudes are commonly assessed among these categories.

In addition, in the environmental values literature, various authors make use of a multitude of terms when reporting on the topic, including:

- environmental worldviews (e.g. Dunlap, Van Liere, Mertig & Jones, 2000),
- ecological values (e.g. Bogner & Wiseman, 2006),
- environmental values (e.g. Boeve-de Pauw & Van Petegem, 2013)
- environmental concern (e.g. Stern & Dietz, 1994),
- environmental beliefs (e.g. Edgell & Nowell, 1989),
- general environmental attitudes (e.g. Liu & Sibley, 2004),
- global environmental attitudes (e.g. Leeming *et al.*, 1995), or
- just environmental attitudes (e.g. Boeve-de Pauw & Van Petegem, 2010).

Boeve-de Pauw and Van Petegem (2013:552) clarify that these labels attempt to describe, what is referred to in the field of social psychology, as ‘primitive beliefs’ about the nature of the earth and the natural environment and humanity’s relationship with it.

Rokeach (1968:159) originally defined values as “centrally held and enduring beliefs that guide actions and judgements across specific situations and beyond immediate goals to more ultimate end-states of existence”. In later research, Schwartz and Bilsky

(1987) and Schwartz (1992) advanced the understanding of values in the field of social psychology. Based on earlier studies on human values and wide cross-cultural studies, Schwartz (1992) defines ‘value’ as “a desirable trans-situational (relatively stable, manifesting itself in different situations) goal varying in importance, which serves as a guiding principle in the life of a person or other social entity”. Values are also defined as “deeply rooted, abstract motivations that guide, justify or explain attitudes, norms, opinions and actions” (Davidov *et al*., 2008:423; Rokeach, 1973; Schwartz, 1992). According to Wiernik *et al*. (2013:830), environmental values are “the priority the natural environment is assigned in making choices, justifying actions, and evaluating events and people” (based on Schwartz, 1992).

Defining the term ‘values’ is widely reported in literature, whilst most of them incorporate five key components, including (Schwartz & Bilsky, 1987), namely that values –

- are concepts or beliefs;
- relate to desirable end states or behaviours;
- transcend specific situations;
- guide selection or evaluation of behaviours and events; and
- are ordered by relative importance.

Values, therefore, form the basis upon which behaviour are grounded (Higham & Carr, 2002:278).

Although basic human values are presented as deeply rooted motivations that guide personal attitudes, the difference between ‘value’ and ‘attitude’ has remained unclear, and according to the Davidov *et al*. (2008) survey, researchers seldom distinguish between values and attitudes. Attitudes can be understood to be the reflection of basic human values (Davidov *et al*., 2008). According to Lawson and Loudon (1996:81), values are distinct from attitudes, because “values work at a higher level of abstraction and are deeper seated, more pervasive influences on behaviour”. Therefore, values influence the attitudes that secondary learners may hold towards specific objects and situations, and are likely to bear directly upon their behaviour towards the birds and the natural environment in which birds live (Higham & Carr, 2002:278).

In general, ‘attitude’ is defined as a psychological tendency that is expressed by evaluating a particular entity with some degree of favour or disfavour (Eagly & Chaiken, 1993; Milfont, 2007). Schultz *et al*. (2005:458) provide a definition of ‘environmental attitude’ as a “collection of beliefs, affect, and behavioural intentions a person holds regarding environmentally related activities or issues”. In addition, attitudes toward environmental behaviours are a rational evaluation of the perceived positive and negative consequences of performing a particular environmental behaviour (Bamberg & Möser, 2007; Wiernik *et al*., 2013:833). According to Wiernik *et al*. (2013:833), the sum of these perceived consequences determines the overall attitude toward the behaviour.

For the purposes of this study, the terms ‘environmental values’ and ‘attitude’ were taken from environmental education and environmental phycology literature and were applied to the context of birds and the natural environment in which birds live. In summary, ‘values and attitudes regarding birds and the environment’ refers mainly to:

- personal values to be desirable goals varying in importance and serving as guiding principles in one’s life;
- deeply rooted, abstract motivations that guide, justify or explain attitudes, norms, opinions and actions regarding birds and bird habitats;
- attitudes towards birds and the natural environment can be understood to be the reflection of basic human values;
- an attitude being defined as a psychological tendency that is expressed by evaluating a particular entity (for example birds) with some degree of favour or disfavour;
- environmental attitudes being a collection of beliefs, affect, and behavioural intentions a person holds regarding environmentally related activities or issues; and
- attitudes toward environmental behaviours influencing birds and the natural habitat of birds, being a rational evaluation of the perceived positive and negative consequences of performing a particular environmental behaviour.

In the present study, ‘environmental and avi-values’ (section 1.5.6), referred to deeply rooted, abstract motivations that guide, justify or explain attitudes, norms, opinions and actions regarding birds and bird habitats.

To measure environmental and avi-values amongst secondary school learners for the present study, instruments measuring general environmental values and attitudes were investigated and are outline below.

3.4.2 The measurement of environmental attitudes and values

A vast number of measuring instruments exist that aim to quantify environmental attitudes and values (Milfont & Duckitt, 2010:80; Dunlap & Jones, 2002), which lead Stern (1992:279) to describe this as an "anarchy of measurement". Boeve-de Pauw and Van Petegem (2013:552) added that the number of instruments measuring environmental attitudes might be matched by the number of scholars working in this field. Therefore, 17 studies using different measuring instruments to report findings related to environmental attitudes and values were investigated and are provided in chronological order below.

A summary of the scales used to measure environmental attitudes and values, by various authors (Stevenson *et al*., 2013:3; Levine & Strube, 2012:314; Boeve-de Pauw & Van Petegem, 2013:551; De Groot & Steg, 2010:370; Duerden & Witt, 2010:383; Goodwin, Greasley, John & Richardson, 2010:398; Johnson & Manoli, 2010:84; McBeth & Volk, 2010:56; Milfont & Duckitt, 2010:82; Uittoa & Saloranta, 2010:1868; Davidov *et al*., 2008:420; Alp *et al*., 2006:213; Bogner & Wiseman, 2006:249; Bögeholz, 2006:74; Coyle, 2005:98; Haron *et al*., 2005:429; Meinhold & Malkus, 2005:519; Leeming *et al*., 1995:5) is provided in Table 3.2 in chronological order.

Table 3.2: Summary of measuring scales for environmental affect (attitudes and values)

Author	Measurement Scale	Population /sample	Type of questions or items	Examples of items
Stevenson *et al.* (2013)	MSELS	Middle school learners in North Carolina, USA (ages 11–15 years)	a) Likert-type scale ranging from "to a great extent" (1) to "to no extent" (5); b) Agreement scale ranging from "strongly agree" (1) to "strongly disagree" (5).	E.g. To what extent do you spend time outdoors alone? E.g. I love the environment
Levine and Strube (2012)	a) NEPS b) Regulations Attitudes Scale (RA)	University students in Washington USA	a) 15-item, 5-point agreement scale b) 5-point agreement scale	a) E.g. Humans are severely abusing the environment

Author	Measurement Scale	Population /sample	Type of questions or items	Examples of items
	c) Technology Attitudes (TA) Scale d) Efficacy Attitudes (EA) Scale e) Implicit Association Test (IAT)		c) 5-point agreement scale d) 5-point agreement scale e) Target words appeared on a computer screen	b) E.g. Pollution laws have gotten too strict in recent years c) E.g. We cannot expect technology and science to solve our problems d) E.g. Even if I act for environmental conservation by myself, it is beneficial e) E.g. Environmental words included were 'recycling', 'conservation', 'nature', while words such as 'pollution', 'deforestation' and 'emissions', represented the industry category
Boewe-de Pauw and Van Petegem (2013)	2-MEV	Children (ages 10–13) in Flanders, Guatemala and Vietnam	5-point Likert-type scale ranging from "strongly disagree" to "strongly agree"	E.g. It upsets me to see the countryside taken over by building sites
De Groot and Steg (2010)	Adapted Basic Human Value Scale (Schwartz, 1992)	Students in the Netherlands	9-point importance scale ranging from "opposed to the value" (1) to "of supreme importance" (4)	E.g. He strongly believes that people should care for nature. Looking after the environment is important to him
Duerden and Witt (2010)	CHEAKS	Middle (ages 11–14) and high school learners (ages 14–18) in the USA	5-point Likert response format, ranging from very untrue (1) to very true (5)	E.g. I am frightened to think people don't care about the environment
Goodwin *et al.* (2010)	Developed an attitude scale	Primary school learners (aged 7–9 years) in England, UK	4-points scale ranging from strongly agree (1) to strongly disagree (4)	E.g. Picking up litter in my area won't make a difference
Johnson and Manoli (2010)	Revised 2-MEV	Upper elementary and middle school children	5-point Likert-type scale ranging from strongly disagree (1) to strongly agree (5)	E.g. *Preservation* I would like to sit at a pond and watch dragonflies

Author	Measurement Scale	Population /sample	Type of questions or items	Examples of items
		(ages 9–12) in the USA		E.g. *Utilisation* To feed people, nature must be cleared to grow food
McBeth and Volk (2010)	MSELS	Middle grade learners (ages 11–15 years) in the USA	a) Likert-type scale ranging from "to a great extent" (1) to "to no extent" (5); b) Agreement scale ranging from "strongly agree" (1) to "strongly disagree" (5).	E.g. To what extent do you spend time outdoors alone? E.g. I love the environment
Milfont and Duckitt (2010)	Environmental Attitudes Inventory (EAI) and the Environmental Attitudes Inventory short form (EAI-S)	Students and adults (ages 16–51 in New Zealand	7-point Likert-type scale ranging from "strongly disagree" (1) to "strongly agree" (7)	E.g. I really like going on trips into the countryside, for example forests or fields
Uitto and Saloranta (2010)	Basic Human Value Scale (Schwartz, 1992)	Secondary school learners (ages 12–13 years) in Finland	6-point Likert-type scale ranging from "very much like me" (6) to "not like me at all" (1)	E.g. He strongly believes that people should care for nature. Looking after the environment is important to him
Davidov *et al.* (2008)	European Social Survey Human Values Scale (ESS)	Respondents 15 years and older, 20 countries in Europe	6-point Likert-type scale ranging from "very much like me" (6) to "not like me at all" (1)	E.g. He strongly believes that people should care for nature. Looking after the environment is important to him
Alp *et al.* (2006)	Adapted CHEAKS	School learners (ages 11–17) in Turkey	5-point Likert response format, ranging from "strongly agree" (1) to "strongly disagree" (5)	E.g. It makes me happy to see people trying to save energy
Bogner and Wiseman (2006)	2-MEV	Secondary school learners in Germany	5-point Likert-type scale ranging from "strongly disagree" to "strongly agree"	E.g. We must set aside areas to protect endangered species
Coyle (2005)	NEETF/Roper Score Card	Adults in USA	Multiple-choice items	E.g. When it is impossible to find a reasonable compromise between economic development and environmental protection, which do you usually believe is more

Author	Measurement Scale	Population /sample	Type of questions or items	Examples of items
				important: economic development or environmental protection? a) Economic development b) Environmental protection c) Depends d) Landfills? e) Don't know
Haron *et al.* (2005)	Developed an attitude scale	Adults in Malaysia	4-point Likert scale ("strongly agree" to "strongly disagree")	E.g. Should the clearing of forests be limited despite its being economically profitable?
Meinhold and Malkus (2005)	Adapted New Environmental Paradigm (NEP) Scale	High school learners (ages 14–18) in the USA	5-point agreement scale	-
Leeming *et al*. (1995)	CHEAKS	Elementary (ages 5–10 years) and Middle school learners (ages 11–15 years) in USA	5-point Likert response format, ranging from "very untrue" (1) to "very true" (5)	E.g. I get angry about the damage pollution does to the environment

Table 3.2 provided a summary of the scales used to measure environmental values and attitudes. In the table, the researcher reported on the authors, measurement scales used, population or sample targeted and the types of questions/items are presented in order to analyse and choose an appropriate scale to use in the present study. An analysis of the main findings in Table 3.2 is given next:

- The majority of the secondary research on which the researcher reported in Table 3.2 was conducted in the USA. Research conducted in Europe, Guatemala, Vietnam, Turkey and Malaysia was also reported in the table.
- Many instruments exist that aim to quantify environmental attitudes and values. Their number might be matched by the number of scholars working in this area (Boeve-de Pauw & Van Petegem, 2013:552). The techniques of attitude measurement can be broadly organised into direct self-reporting methods and implicit measurement techniques (Milfont & Duckitt, 2010). Studies measuring

environmental attitudes have generally used direct self-reporting methods (e.g., interviews and questionnaires), and less frequently implicit techniques (e.g., observation, priming and response competition measures). One example of a study that have used implicit techniques is Levine and Strube (2012) who examined the relationships between explicit and implicit measures of environmental attitudes, knowledge, intentions, and pro-environmental intentions. To measure implicit environmental attitudes, the computerised Implicit Association Test (IAT) was used to determine the strength of automatic associations (Levine & Strube, 2012:315). Furthermore, the studies summarised in Table 2.3, mostly used direct self-reporting methods, more specifically questionnaires/scales, to measure environmental attitudes.

- From Table 3.2, the following scales are applied to measure environmental attitudes and values: The MSELS; NEPS; 2-MEV; Basic Human Value Scale (Schwartz, 1992); CHEAKS; and the Environmental Attitudes Inventory (EAI).
- According to Milfont and Duckitt (2010), the instrument that has gathered the most usage is the NEPS (Dunlap *et al.*, 2000; Dunlap & Van Liere, 1978), which was recently modified for use with children (Manoli, Johnson & Dunlap, 2007). The NEP theoretical framework posits that environmental values are a construct with a one-dimensional higher-order factor structure, where two distinctly different paradigms form the extremes of one single dimension. The dominant social paradigm (DSP) on the one hand assumes endless progress, growth, abundance, and values that contribute to environmental degradation, while the NEP on the other hand regards nature as a limited resource, delicately balanced with, and subject to, human interference (Dunlap & Van Liere, 1978). The NEP scale measures an ecocentric system of beliefs (i.e., humans as just one component of nature) as opposed to an anthropocentric system of beliefs (i.e., humans as independent from, and superior to, other organisms in nature) (Milfont & Duckitt, 2010).
- Furthermore, the measuring scales were applied to various contexts, samples or target groups, including measuring the attitudes or values of school children including:

- primary or elementary school children (ages 5–10 years) (e.g. Boewe-de Pauw & Van Petegem, 2013:551; Goodwin *et al*., 2010:398; Leeming *et al*., 1995:5);
- middle school learners (ages 11–14 years) (e.g. Stevenson *et al*., 2013:3; Johnson & Manoli, 2010:84; McBeth & Volk, 2010:56);
- high school learners (ages 14–18 years) (e.g. Duerden & Witt, 2010:383; Uitto & Saloranta, 2010:1868; Alp *et al*., 2006:213; Bogner & Wiseman, 2006:249; Meinhold & Malkus, 2005:519);
- university students (e.g. Levine & Strube, 2012:314; De Groot & Steg, 2010:370; Milfont & Duckitt, 2010:82) and
- adults (e.g. Coyle, 2005:98; Haron *et al*., 2005:429).

As the target population of the present study comprised secondary school learners (adolescents), the measuring scales that focused on this target group are investigated.

- Bogner and Wiseman (2006:247) argue that measuring adolescent environmental perceptions is a multifaceted task (Bogner & Wiseman, 2006:247). This complex construct requires both the formulation of a theoretical basis that is thoroughly founded in the literature, as well as the construction of a psychometrically sound measurement instrument, employing as a minimum requirement factor-analytic techniques, cross-sample testing and/or cross-validation by other studies (Gray, Borden & Weigel, 1985; Leeming, Dwyer, Porter & Cobern, 1993). These issues led to efforts to develop measures of children's environmental attitude, such as the Children's Attitudes toward the Environment Scale (CATES) (Musser & Malkus, 1994) and the NEP Scale for Children (Manoli *et al*., 2007).
- However, these instruments also had issues of concern that have limited their widespread use. For example, in the case of the CATES scale, psychometric issues, such as poor test-retest reliability and the inclusion of items that are difficult for children to understand (Johnson & Manoli, 2010:85). The NEP Scale for Children has also been shown to have good psychometric properties and contains items about actions within the realm of children's control and which has been tested for understanding with children, but uses a uni-dimensional

construct, which leads to a limited ability to explain attitudes and behaviours (Bogner & Wiseman, 2004). Developmentally appropriate measures with strong psychometric properties and clear theoretical frameworks are essential in detecting changes in environmental attitude. Such measures can provide a basis for the evaluation, improvement, and/or further development of educational programmes as well as investigations of the relationships between attitudes and other variables, such as behaviour (Bogner, 1998; Bogner & Wiseman, 2006). In the absence of a sound age-appropriate measure, Bogner and Wiseman developed the theoretical framework of the more recent 2-MEV (Bogner & Wiseman, 2006), which was designed specifically to tap the environmental values of adolescents.

- 2-MEV was developed in Europe to measure adolescents' attitudes and gauge the effectiveness of educational programmes. It also formed the basis for the theory of ecological attitudes (Johnson & Manoli, 2010:84). The term values stem from a convention established by Rockeach (1968) that indicates a set of closely related attitudes: First-order factors are labelled attitudes; higher order factors are labelled values. The first results with regard to the development and application of the 2-MEV were published in the mid-1990s (Bogner & Wilhelm, 1996). In these earlier versions of the scale, 69 items were used from other attitudinal scales to measure environmental concern (Bogner & Wilhelm, 1996). Through several follow-up studies, the scale was refined (e.g. Bogner & Wiseman, 2002). The item battery used in the scale initially quantified several distinct environmental attitudes via first-order factors ('intent of support', 'care with resources', 'enjoyment of nature', 'altering nature', and 'human dominance'), but the emphasis in the research, using the 2-MEV, has moved to values via higher order factors (Bogner & Wiseman, 2006; Milfont and Duckitt, 2004; Oerke & Bogner, 2010). The 2-MEV was formalised as "environmental values are determined by one's position on two orthogonal components, a biocentric dimension that reflects conservation and the protection of the environment (Preservation or P); and an anthropocentric dimension that reflects the utilisation of natural resources (Utilisation or U)" (Wiseman & Bogner, 2003:5).

- The 2-MEV has been confirmed by several independent scholars across several countries, in:
  - Western Europe (France, Denmark, Germany, Ireland, and Switzerland) (Bogner and Wiseman, 2002);
  - Flanders (Boeve-de Pauw & Van Petegem, 2013);
  - a large-scale study (focusing on adults) across 16 European countries (Munoz, Bogner, Clement & Carvalho, 2009),
  - several non-European countries (Brazil, New Zealand, and South Africa) (Milfont, 2007), and
  - the United States (Johnson & Manoli, 2010).

The authors regard the instrument as an important milestone towards the measurement of the environmental values of adolescents (Bogner & Wiseman, 2006:253). The instrument yield the further advantage that intervention studies throughout the series are comparable, since the core of the instrument has remained constant (Bogner, 1998; 1999; 2002; Bogner and Wiseman, 2004; Bogner & Wiseman, 2006:253).

Consequently, based on the above discussion, the 2-MEV was chosen and adapted in the present study to measure the values of secondary school learners regarding birds and the natural environment in which birds live (see section 4.4).

This section provided a summary of the scales used to measure environmental attitudes and values. Apart from the measurement scales reported in the secondary literature, a synthesis of the findings based on the literature review of environmental attitudes and values are provided in the section that follows.

3.4.3 Synthesis of the findings from secondary literature on environmental attitudes and values

In this section, the researcher provides a synthesis of the main findings from the secondary literature pertaining to environmental attitudes and values.

- The literature review based on ‘environmental attitudes and values’ reveals generally high levels of public support for the environment, for example, usually 65% to 70% of the public conveyed that they would choose the environment, compared to roughly 25% who would select economic development (Coyle, 2005:118). When asked to choose between protection of an endangered bird species and the rights of a logging company to cut down the trees in the bird's habitat, 64% to 68% of the responses favoured bird protection over company rights (Coyle, 2005:118). Furthermore, existing research indicates that young people generally hold positive attitudes toward the environment; they are often able to distinguish between different kinds of environmental problems and understand the negative influence of mistreating the environment (Goodwin *et al*., 2010:394).

- The literature review also suggests that learners have moderately positive or favourable attitudes towards the environment (McBeth & Volk, 2010:61; Alp *et al*., 2006:215; Dunlap *et al*., 2000). For example, citizens generally score high on the NEPS (Dunlap *et al*., 2000), the most widely used measure of explicit environmental attitudes (Levine & Strube, 2012:309).
- Furthermore the findings from the literature review indicate that environmental knowledge increased more than environmental attitudes during indirect nature experiences (e.g. classroom activities), whereas the direct nature experience (e.g. field experience) produced similar levels of knowledge and attitude growth (Duerden & Witt, 2010:379). These results thus suggest that spending time in nature is an important factor predicting affect, thus time spent outdoors complements the use of published curricula in addressing environmental attitudes and sensitivity (Stevenson *et al*., 2013:5).
- It is therefore important, as suggested by Haron *et al*. (2005:433), that both the government and NGOs should formulate and promulgate educational and user-friendly strategies to sensitise public environmental consciousness, convey environmental knowledge, and impress upon the public the importance of environmentally friendly values (Haron *et al*., 2005:433).
- Furthermore, the secondary literature indicated that some environmental attitude scales used are associated with increased engagement in pro-environmental behaviours (De Groot & Steg, 2010:368; Uitto & Salorantaa, 2010:1866; Meinhold & Malkus, 2005:529). For example, in De Groot and Steg's (2010:368) study, the results suggest that, the more respondents are altruistically and biospherically oriented, the more they are self-determined to

act in a pro-environmental manner, while when respondents endorsed egoistic values, they are less self-determined towards pro-environmental behaviour (De Groot & Steg, 2010:368). In addition, results indicate that human-centred values, biocentric nature values, pro-environmental and pro-social attitudes, interests, and motivations are found to be interconnected. Attitudes, interests, and motivations connected to dismissive human and utilistic nature values correlated negatively with the factors (Uitto & Saloranta, 2010:1866). The results therefore suggest the importance of the connections between learners' values and value-related orientations because they affect the learners' engagement in sustainable actions (Uitto and Saloranta, 2010:1866). Results of Meinhold and Malkus' (2005:529) study indicate that adolescents' level of pro-environmental attitudes can effectively predict adolescents' pro-environmental behaviours (Meinhold & Malkus, 2005:529).

However, the findings of Levine and Strube's (2012:319) study, which examined the relationships between explicit and implicit measures of environmental attitudes, knowledge, intentions, pro-environmental intentions and claimed environmental behaviour, suggest that attitudes are best viewed as operating through behavioural intention to environmental behaviour.

The fourth component of the conceptual literacy framework for sustainable avitourism (see Figure 3.1), namely 'behavioural intention' of secondary school learners towards birds, the natural environment and avitourism is discussed next.

3.5 CONCEPTUALISATION OF BEHAVIOURAL INTENTION

This section will focus on the behavioural intention of learners towards the natural environment, in particular birds, bird habitats and avitourism. Behavioural intention is also classified into the affective domain, as the learners' intention to act in an environmentally friendly manner is reflective acting according to emotions and feelings.

Behavioural intentions are considered as a key component and crucial in determining pro-environmental behaviour (Stevenson *et al*., 2013:2; Zsóka *et al*., 2013:136). This notion is based on the theory of planned behaviour (section 2.5.3), suggesting that behavioural intention is the crucial antecedent to behaviour and argues that many of the factors that predict behaviour do so indirectly by first influencing intentions (Levine & Strube, 2012:311). Pro-environmental behaviour or environmental action is operationalised by area-specific pro-environmental behavioural intentions, such as intentions towards nature conservation, waste reduction, energy use and traffic behaviour (Bögeholz, 2006:74).

In this section, the researcher discusses three subsections, namely (section 3.5.1) the definition of pro-environmental behavioural intentions are outlined, followed by (section 3.5.2) a summary of studies related to measuring behavioural intentions. The researcher concludes with (section 3.5.3) a synthesis of the main findings reported in the secondary literature relating to behavioural intentions.

3.5.1 Defining pro-environmental behavioural intention

To conceptualise behavioural intention (see section 1.5.7), various terms (e.g. behavioural intention, intention to act, verbal commitment), definitions or descriptions, were reported in the secondary literature. Behavioural intention is defined as "a person's perceived likelihood or subjective probability that he or she will engage in a given behaviour" (Institute of Medicine, 2002:1). Ajzen (1991) argues that behavioural intentions reflect "how hard a person is willing to try, and how motivated he or she is, to perform the behaviour". In addition, behavioural intention provides "an indication of how much effort individuals are planning to exert in order to perform a particular pro-environmental behaviour" (Ajzen, 1991; Bamberg & Möser, 2007). According to Wiernik *et al*. (2013:843), behavioural intention refers to a person "affirming that one intends to perform an environmentally sustainable behaviour in the future".

Furthermore, behavioural intention is typically measured by asking individuals if they plan or are willing to perform a given behaviour, sometimes within a certain timeframe (e.g. the next six months) (Wiernik *et al*., 2013:832). Thus, behavioural intentions are also referred to and measured by the person's verbal commitment towards environmental topics. According to research by Zsóka *et al*. (2013:136), commitment to environmental topics is crucial in determining pro-environmental behaviour.

'Environmental commitment' is defined as "the extent to which an individual is dedicated to environmental sustainability and is willing to engage in pro-environmental behaviours" (Wiernik *et al*., 2013: 830). According to Maloney and Ward (1973:584), verbal commitment measures what a person states he is willing to do in reference to environment-pollution issues. Furthermore, verbal commitment refers to an expressed intention to act in a specific manner, for example, an environmental problem (Hines *et al*., 1987:5). In the meta-analysis of Hines *et al*. (1987:5), six studies were coded, which assessed the relationship between behavioural intention and environmental behaviour. Hines *et al*. (1987:5) contend that despite the use of the term 'verbal' by the authors of the studies that addressed this relationship, commitment was assessed in all cases by the use of written instruments. Thus, verbal commitment was a measure of intention, not necessarily expressed verbally (Hines *et al*., 1987:5).

For the purposes of this study, the terms 'behavioural intention' and 'verbal commitment' were used and applied to the context of birds, bird habitats, and avitourism. In summary, 'behavioural intention towards birds, the natural environment and avitourism' –

- refers to a learner's perceived likelihood or subjective probability that he or she will engage in actual pro-avi- and environmental behaviour;
- refers to how hard a learner is willing to try, and how motivated he or she is, to perform the behaviour;
- gives an indication of how much effort individuals are planning to exert in order to perform a particular pro-environmental behaviour;
- affirms that one intends to perform an environmentally sustainable behaviour in the future;
- measures the concepts by asking individuals whether they plan to or are willing to perform a given behaviour;
- is also referred to and measured by the person's verbal commitment towards environmental topics;
- comprises a verbal commitment to an expressed intention to act in a specific manner, for example, an environmental problem; and
- reflects a verbal commitment as a measure of intention; it is not necessarily expressed verbally.

In the present study, the term 'behavioural intention towards birds and the natural environment and avitourism' was defined as:

> A learner's perceived likelihood or subjective probability that he or she will engage in actual pro-avi- and environmental behaviour; how hard a learner is willing to try or how much effort the learner is planning to exert to perform a particular pro-environmental behaviour; and also the learner's affirmation or verbal commitment that he or she intends to perform environmentally sustainable behaviour towards birds and bird habitats in the future.

To measure the behavioural intention towards birds and the natural environment, general environmental behavioural intention scales found in the environmental education and/or environmental literacy domain were investigated. The measurement scales used to measure pro-environmental behavioural intentions are discussed in the next section.

3.5.2 The measurement of behavioural intention towards birds, the natural environment and avitourism

Various studies report on findings related to behavioural intention (Stevenson *et al*., 2013:3; Levine & Strube, 2012:316; De Groot & Steg, 2010:371; Duerden & Witt, 2010:383; McBeth & Volk, 2010:56; Boyes, Skamp & Stanisstreet, 2009:667; Carrus, Passafaro & Bonnes 2008:55; Alp *et al*., 2006:213; Fujii, 2006:264; Heath & Gifford, 2006:55; Hsu, 2004:42; Knussen *et al*., 2004:240; Leeming *et al*., 1995:5). Some of these studies (14) were investigated to identify the measurement scales used to measure behavioural intention and are outlined in table format and in chronological order. A summary of the scales used to measure pro-environmental behavioural intentions, the population/sample, type of items, and examples thereof, are provided in Table 3.3.

Table 3.3: Summary of measuring scales for pro-environmental behavioural intentions

Author	Measurement scale	Population /sample	Type of questions or items	Examples of items
Stevenson *et al.* (2013)	MSELS	Middle school learners in North Carolina, USA (ages	Likert scale ranging from "very true" (1) to "very false" (5)	E.g. To save water, I would be willing to use less water when I bathe

Author	Measurement scale	Population /sample	Type of questions or items	Examples of items
		11–15 years)		
Levine and Strube (2012)	Intended Pro-Environmental Behaviour scale (Cordano *et al*. (2003)	University students in Washington USA	5-point scale	E.g. To sign a petition to support stricter environmental laws (How likely they would be to perform different behaviours)
De Groot and Steg (2010)	a) Consumer choice task (Verplanken & Holland, 2002) b) Donation intention instrument (De Groot & Steg, 2008)	Students in the Netherlands	a) Matrix indicating favourable car or unfavourable car; 5-point scale ranging from – – (1), indicating that the preferred car scored very low on environmental aspects, to ++ (5), indicating that the preferred car scored very high on environmental aspects. b) Provide a list of donating choices	a) E.g. Choose your most favourable car for work purposes (the car varied on 7 different aspects (e.g. model, engine, power, safety, size, emissions, comfort and cost) b) E.g. If you have to donate €10 to charity, then I would give: €xx to Habitat for Humanity and €xx to Greenpeace
Duerden and Witt (2010)	Verbal commitment subscale: CHEAKS	Middle (ages 11–14) and high school learners (ages 14–18) in the USA	5-point Likert-type response format, ranging from “very untrue” (1) to “very true” (5)	E.g. To save water, I would be willing to turn off the water while I wash my hands
McBeth and Volk (2010)	Verbal commitment subscale: MSELS	Middle grade learners (ages 11–15 years) in the USA	5-point Likert-type scale ranging from “very true” (1) to “very false” (5)	E.g. To save energy, I would be willing to use dimmer light bulbs
Boyes *et al.* (2009)	Developed a willingness to act scale	Secondary school learners	5-point scale, ranging from “definitely” to “probably” not	E.g. Even if it took me longer and was more inconvenient, I would try to use buses and trains instead of a car
Carrus *et al.* (2008)	Developed a behavioural intention scale	Adults	5-point bipolar scale, ranging from “unlikely/undecided” (1) to “likely/decided” (5)	E.g. During the next two weeks I intend to use public transportation

Author	Measurement scale	Population /sample	Type of questions or items	Examples of items
				instead of a private car to go to work
Alp *et al*. (2006)	Adapted CHEAKS	School learners (ages 11–17) in Turkey	5-point Likert-type response format, ranging from “very untrue” (1) to “very true” (5)	E.g. To save water, I would be willing to turn off the water while I wash my hands
Fujii (2006)	Developed a behavioural intention scale	Adults in Japan	7-point scale ranging from “strongly disagree” (1) to “strongly agree” (7)	E.g. I intend to do X, for four types of pro-environmental behaviours
Heath and Gifford (2006)	Developed a behavioural intention scale	Adults in Canada	5-point Likert-type scale ranging from “strongly disagree” to “strongly agree”	E.g. “I intend to take concrete steps to do something to mitigate the negative effects of global climate change”
Hsu (2004)	Intention to act scale (IA): Environmental literacy instrument (Hsu & Roth, 1998)	College students in Taiwan	-	E.g. “To what extent do you believe that *you are willing* to make use of political action to help prevent or resolve environmental problems?”
Knussen *et al*. (2004)	Developed an intentions to recycle scale	Adults	7-point scales from “no intention” to “firm intention”	E.g. “We want to know what you intend to recycle within the next month” for each type of waste (newspaper, glass, plastic, and aluminium).
Leeming *et al*. (1995)	Verbal commitment subscale: CHEAKS	Elementary (ages 5–10 years) and Middle school learners (ages 11–15 years) in USA	5-point Likert response format, ranging from “very untrue” (1) to “very true” (5)	E.g. To save water, I would be willing to turn off the water while I wash my hands
Maloney and Ward (1973)	Verbal commitment subscale: The Ecology Scale	Adults in USA	True–false format	E.g. I’d be willing to ride a bicycle or take the bus to work in order to reduce air pollution

Table 3.3 provided a summary of the scales used to measure behavioural intention. The researcher reported on the authors, measurement scales used, population or sample targeted and types of questions/items. The researcher presented this information to analyse and choose an appropriate scale to use in the present study. An analysis of the main findings in Table 3.3 is provided next.

- *Pro-environmental behaviour* or environmental action is operationalised by area-specific pro-environmental behavioural intentions, such as intentions towards nature conservation, waste reduction, energy use and traffic behaviour (Bogeholz, 2006:74). Thus, the scales measure “intentions to act” or “willingness to act” towards various environmental topics, such as the six content-dependent sub-domains used in the CHEAKS verbal commitment subscale, including animals, energy, pollution, recycling, water and general environmental issues (Leeming *et al*., 1995). These sub-domains are used in the present study to measure the youth’s pro-environmental behavioural intentions towards birds, the natural environment and avitourism (e.g. I would be willing to save water because it is important for the survival of birds; I would be willing to separate my family's rubbish for recycling if it could preserve bird habitats).
- The studies on which this study reported were conducted in various countries including USA, the Netherlands, Australia, Italy, Turkey, Japan, Canada, Taiwan, and Scotland and are therefore representative of most continents, except for the African continent.
- The following measurement scales were applied to measure pro-environmental behavioural intention:
  - MSELS;
  - Intended Pro-Environmental Behaviour scale (Cordano *et al*., 2003, cited in Levine & Strube, 2012);
  - CHEAKS;
  - Verbal commitment subscale of the Ecology Scale;
  - Intention to act subscale of the Environmental Literacy Instrument (Hsu & Roth, 1998).

Some authors developed their own study-specific scales, for example a willingness to act scale (Boyes *et al*., 2009:667), a behavioural intention scale (Carrus *et al*. 2008:55; Fujii, 2006:264; Heath & Gifford, 2006:55), and intentions to recycle scale (Knussen *et al*., 2004:240).

From Table 3.3, it is evident that various types of questions were used to measure pro-environmental behavioural intention. The measurement scales most often used to measure pro-environmental behavioural intentions was the verbal commitment subscale of CHEAKS and the verbal commitment subscale of the MSELS. These scales used a 5-point Likert-type scale ranging from "very true" (1) to "very false" (5). Both scales were derived from the verbal commitment subscale of the Ecology Scale of Maloney and Ward (1973), which was the first multi-dimensional scale to measure environmental concern.

Furthermore, the measuring scales were applied to various contexts, samples or target groups, including measuring the behavioural intentions of schoolchildren including:

- primary or elementary school children (e.g. Leeming *et al*., 1995:5);
- middle school learners (e.g. Stevenson *et al*., 2013:3; Duerden & Witt, 2010:383; McBeth & Volk, 2010:56; Leeming *et al*., 1995:5);
- high school learners (e.g. Duerden & Witt, 2010:383; Boyes *et al*., 2009:667; Alp *et al*., 2006:213; Leeming *et al*., 1995:5);
- university students (e.g. Levine & Strube, 2012:314; De Groot & Steg, 2010:370; Hsu, 2004:42) and
- adults (e.g. Carrus *et al*. 2008:55; Fujii, 2006:264; Heath & Gifford, 2006:55; Knussen *et al*., 2004:240; Maloney & Ward, 1973).

As the target for the present study comprised secondary school learners (adolescents), the measuring scales that focused on this target group were investigated.

For the present study, measures of pro-environmental behavioural intentions were based on the verbal commitment subscale of CHEAKS (Leeming *et al*., 1995) (section 4.4). The reasons for choosing the verbal commitment subscale of CHEAKS were:

- CHEAKS was specifically developed for elementary, middle and junior high school learners (Leeming *et al*., 1995). Secondary learners in junior high school (Grades 8–10, aged 13–17 years) were the target group for the present study.

- Moreover, the scale has sound psychometric properties, proved to be a reliable and valid instrument and can be used in a variety of settings (Leeming *et al*., 1995).

This section provided a summary of the scales used to measure behavioural intention towards the environment. Apart from the measurement scales reported in the secondary literature, a synthesis of the findings based on the literature review of pro-environmental behavioural intention is provided in the next section.

3.5.3 Synthesis of findings from secondary literature on pro-environmental behavioural intention

This section provides a synthesis of the main findings from the secondary literature pertaining to behavioural intention towards the natural environment.

- The general environmental literature (as early as 1973) reveals that most persons have a relatively high degree of verbal commitment, indicating that most people say they are willing to do a great deal to help curb environmental problems (Maloney & Ward, 1973:584). Furthermore, the research discussed in the current literature review, suggest that middle school learners' scores were generally higher for verbal commitment (intention to act) than for actual commitment (pro-environmental behaviour) (McBeth & Volk, 2010:61). Additionally, younger female students with more willingness to make sacrifices and higher emotional bonding toward nature tend to act more friendly toward the environment (Alp *et al*., 2006:220). However, according to Boyes *et al*. (2009:668), it was evident that for actions involving minimal inconvenience, such as switching off un-used electrical appliances and recycling, learners' willingness to act was greater than for actions relating to personal inconvenience, such as using public, rather than private, transport. Furthermore, Boyes *et al*. (2008) found that not only is the willingness of teenagers to reduce personal consumption limited, but their awareness about the utility of such sacrifices is also low.
- Moreover, the literature review (from the environmental education domain) reveals generally high levels of public support for the environment. Commitment to the environment, for example, is usually 65% to 70% of the public who say

they would choose the environment, compared to roughly 25% who would select economic development (Coyle, 2005:118).

- Furthermore, the findings indicate that spending time in nature were significantly related to an environmental affect, which is not surprising, as time spent outdoors has been linked to improvement of environmental attitudes and behavioural intentions (Stevenson *et al.*, 2013:8). These results thus suggests that spending time in nature is an important factor predicting affect, thus time spent outdoors complements the use of published curricula in addressing environmental attitudes and behavioural intentions (Stevenson *et al.*, 2013:5).
- The literature review also suggests that self-efficacy explained most of the variance in behavioural intention, followed by egocentrism, and support for the free-market system. These findings suggest that it will be fruitful to promote the sense of self-efficacy as it appears that before individuals are ready to act against for example, climate change, they must believe that even a small thing one individual can do will make a meaningful difference (Heath & Gifford, 2006:64). Furthermore, the results suggest that, the belief that global climate change is actually occurring, is an important prerequisite to be willing to take action (Heath & Gifford, 2006:64). This result corroborates the argument advanced by O'Connor, Bord and Fisher (1999:469) that "risk perceptions matter in predicting behavioural intentions. Risk perceptions are not a surrogate for general environmental beliefs but have their own power to account for behavioural intentions" (Heath & Gifford, 2006:64).
- Additionally, results indicate that empowerment variables (i.e. locus of control, knowledge of and skills in using environmental action strategies, and intention to act) are crucial in the cultivation of pro-environmental behaviour because these variables give learners a sense that they can make changes and help resolve environmental problems (Hsu, 2004:45; Hungerford & Volk, 1990).
- Furthermore, Fujii (2006:266) finds that *perceived* ease of implementation, or perceived behavioural control, had a significant positive effect on behavioural intention for pro-environmental behaviour. If implementing a specific pro-environmental behaviour is believed to be difficult, the behaviour may not be attempted, even if the motivation to do so is present (Fujii, 2006:263). Thus, the

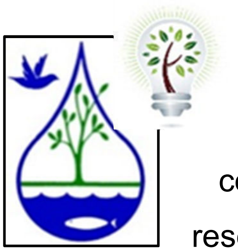
perceived ease of implementing a pro-environmental behaviour has a positive effect on pro-environmental behaviour (Fujii, 2006:263).

- Furthermore, the literature review (from the environmental phycology domain) indicates that some behavioural intention scales used were associated with increased engagement in pro-environmental behaviours (De Groot & Steg, 2010:368; Alp *et al*., 2006:220). For example, in the study by Alp *et al*. (2006:220), the results suggest that environmentally responsible behaviours appear to be predicted by behavioural intentions, environmental affects, gender, and age. In addition, the results of De Groot and Steg (2010:368) show that the more respondents were altruistically and biospherically oriented, the more they were self-determined to act in a pro-environmental manner, while when respondents endorsed egoistic values, they were less self-determined towards pro-environmental behaviour.

While 'pro-environmental behavioural intentions' points to the learners' affirmation or verbal commitment that they intend to perform environmentally sustainable behaviour towards birds and bird habitats in the future, it is increasingly recognised that pro-environmental actions (actual commitment) are essential for decreasing environmental problems and to promote sustainable lifestyles (De Groot & Steg, 2010:368). Therefore, the question relating to what do people actually do on a day-to-day, personal level to protect and care the environment, is the type of behaviour that is referred to as "pro-environmental behaviour" (De Groot & Steg, 2010:368).

The last component of the conceptual literacy framework for sustainable avitourism (see Figure 3.1), 'pro-environmental and avi-behaviour' of secondary school learners is discussed next.

3.6 CONCEPTUALISATION OF ACTUAL PRO-ENVIRONMENTAL AND AVI-BEHAVIOUR



According to Zsóka *et al*. (2013:128), the main goal of environmental education should be to engage students with a complex toolset, containing cognitive, affective and action elements, which all contribute to behavioural change. In the previous sections the researcher outlined cognitive and affective components, while this section the researcher is focusing on the action component. The Tbilisi Declaration highlights the encouragement of environmental participation (action), meaning, "to provide social groups and individuals with an opportunity to be actively involved at all levels in working toward resolution of environmental problems" (Stevenson *et al*., 2013:1; Igbokwe, 2012:650; UNESCO, 1978:15).

There is a growing awareness that individual human behaviour contributes to environmental problems, causing the depletion of natural assets and resources (De Groot & Steg, 2009:1; Mobley *et al*., 2010:421; Haron *et al*., 2005:432). Individual actions, such as consumer packaging, energy usage, water usage, lawn care and pest management, the size of homes and vehicles, and other factors have collectively caused the individual's environmental 'footprint' to intensify (Vlek & Steg, 2007; Coyle, 2005:33). Changes in such human behaviour are thus needed to reduce environmental impacts (Steg & Vlek, 2009). According to Goodwin *et al*. (2010:393), changing environmental behaviour such as recycling, litter and energy use and encouraging environmental citizenship are referred to as 'pro-environmental behaviour' and according to Coyle (2005:33), 'environmental stewardship'.

The importance of understanding the behaviour of young people, in this case secondary school learners, towards the environment and of finding effective ways to influence this behaviour through education is therefore beyond dispute (Zsóka *et al*., 2013:126; Goodwin *et al*., 2010:393).

This section consists of three subsections: first, in section 3.6.1, defining pro-environmental behaviour, secondly, in section 3.6.2, a summary of studies related to the measurement of pro-environmental behaviour, and lastly in section 3.6.3, a synthesis of results reported in secondary literature pertaining to pro-environmental behaviour.

3.6.1 Defining actual pro-environmental and avi-behaviour

Pro-environmental behaviour (see section 1.5.8) is an approach used to help ameliorate environmental problems, such as climate change, conflicts over resources and pollution (Osbaldiston & Schott, 2012:258). Pro-environmental behaviour is described as an attempt to influence the individual's behaviour to act in a more environmentally friendly or environmentally sustainable manner. Individuals are therefore encouraged to adopt behaviours that are comparatively better for the environment (Osbaldiston & Schott, 2012:258). These behaviours are called pro-environmental behaviours, although they also are referred to as conservation behaviours, environmentally friendly behaviours, environmentally significant behaviours, environmentally sustainable behaviours, and responsible environmental behaviours (Osbaldiston & Schott, 2012:258).

To conceptualise pro-environmental behaviours, various terms (e.g. environmentally responsible behaviours, environmentally significant behaviours, and actual commitment to pro-environmental behaviour), definitions or descriptions, and theories are reported in secondary literature.

According to Eilam and Trop (2012:2212), the term 'environmental behaviour' is referred to as "any active responsiveness to current environmental issues, believed to be pro-environmental by the person performing the response". 'Pro-environmental behaviour' can be defined as the action of an individual or group that advocates the sustainable or diminished use of natural resources (Sivek & Hungerford, 1990; Osbaldiston & Schott, 2012). Furthermore, pro-environmental behaviours are viewed as a mixture of self-interest (e.g. to pursue a strategy that minimises one's own health risk) and of concern for other people, the next generation, other species or a whole eco-systems (e.g. preventing air pollution that may cause risks for the health of others or the global climate) (Bamberg & Möser, 2007).

According to Yeung (1998:252), environmentally responsible behaviour therefore includes the 'action' dimension of environmental consciousness[25].

According to Erdoğan *et al.* (2009:17), environmentally responsible behaviours include active and considered participation aimed at solving environmental problems and resolving environmental issues.

Stern (2000:408) defines 'environmentally significant behaviour' from two perspectives, namely an impact-oriented, and an intent-oriented definition. From the impact perspective, 'environmentally significant behaviour' is defined as "the extent to

[25] 'Environmental consciousness' is a measure of a person's ability to understand the nature of environmental processes and problems, her or his degree of concern for environmental quality and the extent to which he or she is committed to positive environmental behaviour in everyday life (Yeung, 1998:252).

which it changes the availability of materials or energy from the environment or alters the structure and dynamics of ecosystems or the biosphere itself" (Stern, 2000:408). 'Environmentally significant behaviour' can also be defined from an intent perspective, as environmental protection has become an important consideration in human decision-making. Therefore it can now be defined from the actor's standpoint as "behaviour that is undertaken with the intention to change (normally, to benefit) the environment" (Stern, 2000:408).

Following Stern (2000), De Groot and Steg (2010:368; 2009:1) and Steg and Vlek (2009:309) define pro-environmental behaviours as "those behaviours that change the availability of materials or energy from the environment or alters the structure and dynamics of ecosystems or the biosphere positively". 'Pro-environmental behaviour' refers to behaviour that harms the environment as little as possible, or even benefits the environment (Steg & Vlek, 2009:309). Acting pro-environmentally entails that people benefit others or the environment, whereas often, no direct individual benefits are received by engaging in these behaviours. For example, reducing car use is beneficial for society and the environment because it reduces environmental pollution, extensive land use, and congestion. However, reducing car use has individual disadvantages, such as decreased freedom or increased travel times (De Groot & Steg, 2009:1). Pro-environmental behaviour often implies acting morally right, that is, acting on considerations of what is the right or wrong thing to do (Thøgersen, 1996), as it often does not benefit individual interests in the short term, but mainly benefits other people or the environment (De Groot & Steg, 2009:1; Thøgersen, 1996).

According to Mobley *et al*. (2010:3), environmentally responsible behaviours occur when an individual or group aims "to do what is right to help protect the environment in general daily practice". Monroe's (2003:115) conceptualisation of environmentally responsible behaviours as "a general approach to seeking information, making decisions, and valuing a stewardship ethic" is thus a reflection of responsible citizenship (Hungerford & Volk, 1990).

Following Mobley *et al*. (2010) and Iwata (2001), Chiu *et al*. (2014:879) define 'environmentally responsible behaviour' as "a characteristic of individuals who are knowledgeable and concerned about the environment and will therefore engage in a behaviour that would avoid damage to the environment".

According to Haron *et al*. (2005:427), 'environmentally responsible consumer behaviour' relates to consumption activities that benefit, or cause less harm to the environment than substitutable activities. Hence, consistent with the focus of sustainable consumption, which is concerned with the economic activity of choosing, using and disposing of goods and services and how this can be changed to bring social and environmental benefits, consumers can behave in a more environmentally friendly way by changing the patterns they use to acquire, utilise and dispose of goods or products (Haron *et al*., 2005:427).

Furthermore, the term 'responsible environmental behaviour' refers to "the variety of recognised approaches to environmental action available to individuals or groups for use in preventing or resolving environmental problems or issues" (Hsu & Roth 1998:232; Marcinkowski, 1988; Peyton, 1977).

From this discussion of pro-environmental behaviour, it is evident that various definitions and descriptions exist. For the purposes of this study, the term pro-environmental behaviour was taken (from the environmental education, environmental literacy and environmental psychology domains) and applied to the context of birds and the natural environment in which birds live, as this type of behaviour influences the sustainability of bird habitats and bird life. In summary, 'pro-environmental behaviour regarding birds and the environment' refers mainly to:

- the 'action' dimension of environmental consciousness and/or environmental literacy;
- an attempt to influence the individual's behaviour to act in an environmentally friendly or environmentally sustainable manner to protect birds and bird habitats;
- active responsiveness to current environmental issues (influencing birds and bird habitats) believed to be pro-environmental by the person performing the response;
- active and considered participation aimed at solving environmental problems and resolving environmental issues;
- the variety of recognised approaches to environmental action available to individuals or groups for use in preventing or resolving environmental problems or issues;

- the action of an individual or group that advocates the sustainable or diminished use of natural resources;
- a mixture of self-interest (e.g. to pursue a strategy that minimises one's own health risk) and of concern for other people, the next generation, other species (e.g. bird species) or whole eco-systems (e.g. preventing air pollution that may cause risks for the health of others or the global climate influencing birds and bird habitats);
- behaviours that change the availability of materials or energy from the environment or alters the structure and dynamics of ecosystems or the biosphere positively;
- consumption activities that benefit, or cause less harm to the environment than substitutable activities, and hence is consistent with the focus of sustainable consumption;
- behaviour that harms the environment as little as possible, or even benefits the natural environment in which birds live;
- behaviour that implies acting morally right, that is, acting on considerations of what is the right or wrong thing to do, what is right to help protect the environment in general daily practice;
- a general approach to seeking information, making decisions, and valuing a stewardship ethic; and
- a characteristic of individuals who are knowledgeable and concerned about the environment and will therefore engage in a behaviour that would avoid damage to the environment.

In the present study, pro-environmental and avi-behaviour refers to:

> Behaviour that consciously seeks to minimise the negative influence of learners' actions on the natural and built world (for example, minimise resource and energy consumption that will support the existence of birds, reduce waste production to protect and save birds.

Various researchers measured the extent to which people are committed to positive environmental behaviour in everyday life. A summary of some of these studies are given next.

3.6.2 The measurement of pro-environmental behaviour

To measure the pro-environmental behaviour towards birds and the natural environment, general environmental behaviour scales found in the environmental education, environmental literacy and/or environmental psychology domain had to be investigated. Table 3.4, summarises 20 studies that measured pro-environmental behaviour, and which is reported in chronological order (Stevenson *et al*., 2013:3; Zsóka *et al*., 2013:133; Levine & Strube, 2012:316; Michalos *et al*., 2012:225; Boewe-de Pauw & Van Petegem, 2013:563; Dolnicar, 2010:7; Duerden & Witt, 2010:383; Goodwin *et al*., 2010:398; McBeth & Volk, 2010:56; Milfont & Duckitt, 2010:82; Boyes *et al*., 2009:667; Kaiser & Schultz, 2009:192; Mobley *et al*., 2010:431; Kaiser, Oerke & Bogner, 2007:245; Alp *et al*., 2006:213; Coyle, 2005:34; Meinhold & Malkus, 2005:518; Frick *et al*., 2004:1603; Iwata, 2004:707; Leeming *et al*., 1995:5; Maloney & Ward, 1973:584). The scales used to measure pro-environmental behavioural, the population/sample, type of items/questions, and examples thereof are given in Table 3.4.

Table 3.4: Summary of measuring scales for pro-environmental behaviour

Author	Measurement scale	Population /sample	Type of questions or items	Examples of items
Stevenson *et al.* (2013)	MSELS	Middle school learners in North Carolina, USA (ages 11–15 years)	Likert scale ranging from "very true" (1) to "very false" (5)	E.g. I have asked my family to recycle some of the things we use
Zsóka *et al.* (2013)	Survey question on pro-environmental behaviour	University students and high school learners	Indicate pro-environmental behaviour if they participate in the pro-environmental activity	E.g. Decreased water consumption
Levine and Strube (2012)	a) Environmental behaviour measure from the NEETF/Roper Report (2000) b) Environmental responsible behaviour	University students in Washington USA	5-point scale indicating how often they engaged in these behaviours	E.g. I keep the water running while washing my face

Author	Measurement scale	Population /sample	Type of questions or items	Examples of items
	scale (Iwata, 2004)			
Michalos *et al.* (2012)	Developed measure for behaviours favourable toward sustainable development	Tenth grade learners (ages 15–16 years) in Manitoba, Canada	5-point Likert-type scale ranging from "strongly disagree" to "strongly agree"	E.g. I have changed my personal lifestyle to reduce Waste
Boewe-de Pauw and Van Petegem (2013)	Subscale of the CHEAKS (Leeming *et al.*, 1995)	Children (ages 10–13) in Flanders, Guatemala and Vietnam	5-point Likert-type response format ranging from "very true" to "very false"	E.g. To save energy, I turn off the lights when they are not needed
Dolnicar (2010)	Survey question on environmental friendly behaviour	Adults in Australia	Engage in 30 different behaviors never, rarely, sometimes or always	E.g. I picked up litter that was not my own
Duerden and Witt (2010)	Actual commitment subscale: CHEAKS (Leeming *et al.*, 1995)	Middle (ages 11–14) and high school learners (ages 14–18) in the USA	5-point Likert response format, ranging from "very untrue" (1) to "very true" (5)	E.g. I have asked my family to recycle some of the things we use
Goodwin *et al.* (2010)	Dichotomous variables for behaviour change analysis	Primary school learners (aged 7–9 years) in England, UK	Behaviour change: Respondents were offered three options: (a) I am already doing this and I will keep doing it (b) I haven't thought of doing this (c) I don't want to do this	E.g. Reduce the amount of water I use at home
McBeth and Volk (2010)	MSELS	Middle grade learners (ages 11–15 years) in the USA	5-point Likert scale ranging from "very true" (1) to "very false" (5)	E.g. I have talked to my parents about how to help with environmental problems
Milfont and Duckitt (2010)	Ecological Behaviour Scale	Students and adults (ages 16–51 in New Zealand	5-point rating scale from "never" (1) to "very often" (5)	E.g. Conserved gasoline by walking or cycling
Mobley *et al.* (2010)	Environmentall y Responsible Behaviour	Adults in USA	5-point Likert-type scale ranging from "never" (1) to "always" (5)	E.g. Bought organic fruits and vegetables, which are grown without pesticides or chemicals

Author	Measurement scale	Population /sample	Type of questions or items	Examples of items
Boyes *et al.* (2009)	Believed usefulness of pro-environmental action	Secondary school learners	5-point scale, ranging from "by quite a lot" (1) to "by nothing at all really" (5)	E.g. If people didn't use their cars so much, global warming would be reduced
Kaiser and Schultz (2009)	Conservation Behaviour Scale	Adults	5-point scale ranging from "never" (1) to "occasionally" (3) to "always" (5)	E.g. I bring empty bottles to a recycling bin
Kaiser *et al.* (2007)	Behaviour-based environmental attitude	Secondary school learners (ages 10– 18 years) in Bavaria, Germany	(a) yes/no format "ecological engagement" or "non-engagement" (b) polytomous response format ranging from "never" to "always"	E.g. I refrain from battery-operated appliances E.g. I buy certified organic foods
Alp *et al.* (2006)	Actual commitment subscale: CHEAKS	School learners (ages 11–17) in Turkey	5-point Likert-type response format, ranging from "strongly agree" (1) to "strongly disagree" (5)	E.g. To save energy, I turn off the lights at home when they are not in use
Coyle (2005)	NEETF/Roper Score Card	Adults	Responses included "never do it", sometimes do it" and "frequently do it"	E.g. Recycle things such as newspapers, cans and glass
Meinhold and Malkus (2005)	Young People and the Environment survey	High school learners	Responses included " I have done this in the last 12 months", "I would consider doing this" and "I would not consider doing this"	E.g. Choosing household products that are better for the environment
Frick *et al.* (2004)	General Ecological Behaviour Scale (Kaiser, 1998)	Adults	(a) yes/no format "ecological engagement" or "non-engagement" (b) polytomous response Format, ranging from "never to "always"	E.g. I bring empty bottles to a recycling bin
Iwata (2004)	Environmentally Responsible Behaviour Scale	Students in Japan	5-point Likert-type scale ranging from "highly agree" (1) to "highly disagree" (5)	E.g. I keep the water running while washing my face
Leeming *et al.* (1995)	Actual commitment	Elementary (ages 5–10	5-point Likert-type response format,	E.g. I have talked to my parents about how to help

Author	Measurement scale	Population /sample	Type of questions or items	Examples of items
	subscale: CHEAKS	years) and Middle school learners (ages 11–15 years) in USA	ranging from “very untrue” (1) to “very true” (5)	with environmental problems
Maloney and Ward (1973)	Actual commitment subscale: The Ecology Scale	Adults in USA	True–false format	E.g. I save some waste materials for recycling

Table 3.4 provided a summary of the scales used to measure actual pro-environmental behaviours. The researcher reported on the authors, the measurement scales used, the population or sample targeted, and types of questions/items that are outlined in order to analyse and choose an appropriate scale to use in the present study. An analysis of the main findings reported in the studies presented in Table 3.4 is provided next.

- It is evident that pro-environmental behaviour or environmental action is described by how people actually behave with regard to the environment (Zsóka *et al*., 2013:132). Furthermore, pro-environmental behaviour is operationalised by measuring an individual’s actual commitment to act in a more environmentally friendly or environmentally sustainable manner (Osbaldiston & Schott, 2012). Therefore, in contrast with the measurement of behavioural intention where the question is asked, “How do you think about the environment?” the question of “What do you do about the environment?” is asked when measuring pro-environmental behaviour (McBeth *et al*., 2011:160; Stevenson *et al*., 2013:4). Pro-environmental behaviour or actual commitment therefore measured what a person actually does in relation to environment-pollution issues (Maloney & Ward, 1973:584).
- Respondents were asked to report on a wide variety of environmentally relevant actions, which focused on everyday behaviours that can be done to help the environment, such as recycling, using public transportation or transport habits, turning off lights and electrical appliances when not in use, and reducing water use. (Goodwin *et al*., 2010:399; Levine & Strube, 2012:316; Zsóka *et al*.,

2013:132). In addition, pro-environmental behaviour was characterised through the analysis of environmental behaviour issues such as litter, food waste and climate change (Goodwin *et al*., 2010:398).

- Furthermore, actions can be divided into direct actions (for example transport, power generation, domestic, personal, communal) and indirect actions (legislation, taxation, co-operation, education) (Boyes *et al*., 2009:665). Direct actions relate to carbon dioxide emissions caused by personal transport, other forms of energy use and wastage, and methane and nitrogen oxides emissions; while indirect actions were concerned about education about global warming, and voting for pro-environmental policies (Boyes *et al*., 2009:664).
- To provide a measure of ecological behaviours, various environment- related domains or sub-domains were selected, for example: energy conservation, mobility and transportation, waste avoidance, recycling, consumerism, and vicarious behaviours toward conservation (Kaiser *et al*., 2007:245; Frick *et al*., 2004:1603), and animals, energy, pollution, recycling, water and general environmental issues (Leeming & Dwyer, 1995). The sub-domains offered by Leeming and Dwyer (1995), were used in the present study to measure the youth's pro-environmental behaviour towards birds, the natural environment and avitourism (e.g. I have talked to someone about pollution that causes destruction of bird habitats).
- To measure pro-environmental behaviour, participants were asked to indicate how often they had engaged in pro-environmental behaviours in the last year (for example, looked for ways to reuse things, recycled newspaper, recycled cans or bottles, encouraged friends of family to recycle, purchased products in reusable or recyclable containers, picked up litter that was not your own, composted food scraps, conserved gasoline by walking or cycling) (Levine & Strube, 2012:316; Mobley *et al*., 2010:430). Therefore, the measuring scales include actions that relate to a person's own conservation performance (Frick *et al*., 2004:1603), and whether an individual have engaged in or would engage in any environmental actions (Zsóka *et al*., 2013:132; Meinhold & Malkus, 2005:518).

- The following measurement scales were applied to measure pro-environmental behaviour:
  - The actual commitment subscale of the MSELS (McBeth & Volk, 2010:57; McBeth *et al*., 2011:160; Stevenson *et al*., 2013:4);
  - Actual commitment subscale of the CHEAKS (Boewe-de Pauw & Van Petegem, 2013:563; Duerden & Witt, 2010:383; Alp *et al*., 2006:213; Leeming *et al*., 1995);
  - Ecological Behaviour Scale (Milfont & Duckitt, 2004:291; Schultz & Zelezny, 1998);
  - Conservation Behaviour Scale (Kaiser & Schultz, 2009:192);
  - Environmentally Responsible Behaviour Scale (Mobley *et al*., 2010:431);
  - Young People and the Environment survey (Meinhold & Malkus, 2005:518);
  - General Ecological Behaviour Scale (Kaiser *et al*., 2007:245; Frick *et al*., 2004:1603);
  - Environmentally Responsible Behaviour Scale (Iwata, 2004:707); and lastly,
  - the actual commitment subscale of The Ecology Scale (Maloney & Ward, 1973:584).

Some authors developed their own study-specific scales, for example the pro-environmental behaviour measure (Zsóka *et al*., 2013:133), or measure for behaviours favourable toward sustainable development (Michalos *et al*., 2012:225). A combination of scales was also used. For example, Levine and Strube (2012:316) used the Environmental Behaviour measure from the National Environmental Education & Training Foundation [NEETF] / Roper Report (2000) and the Iwata (2004) the measure of Environmentally Responsible Behaviour.

- From most of the studies reported in Table 3.4, it was also found that the measure that was used, was based on behavioural self-reports (self-reported environmental behaviour) (Boewe-de Pauw & Van Petegem, 2013:563; Steg & Vlek, 2009:310; Leeming *et al*., 1995).
- From Table 3.4 it is evident that various types of questions are used to measure pro-environmental behaviour. The measurement scales most often used to measure pro-environmental behaviour are the actual commitment subscale of

the CHEAKS and actual commitment subscale of the MSELS. These scales used a 5-point Likert-type scale ranging from “very true” (1) to “very false” (5). Both scales were derived from the actual commitment subscale of the Ecology Scale of Maloney and Ward (1973), the first multi-dimensional scale to measure environmental concern.

- Furthermore, participants were asked to indicate how often they participate in pro-environmental behaviours, actions or activities. For example, some authors use a polychromous response format, including options such as “never”, “seldom”, “occasionally”, “often” and “always” (Kaiser & Schultz, 2009:190; Kaiser *et al*., 2007:245; Frick *et al*., 2004:1603). Milfont and Duckitt applied a five-point rating scale from “never” to “very often” (Milfont & Duckitt, 2010:89; 2004), while other authors used the responses “never do it”, “sometimes do it”, or “frequently do it” to indicate how often respondents perform environmental activities (Coyle, 2005:36; Levine & Strube, 2012:316; Alp *et al*., 2006:213). In the case where authors developed their own study specific measurement scales, different scales were applied, for example, a 5-point Likert-type scale ranging from “strongly disagree” to “strongly agree” (Michalos *et al*., 2012:225) and ranging from “highly agree (1) to “highly disagree” (5) (Iwata, 2004:707).
- The studies on which this study reports were conducted in various countries such as USA, Canada, England, Germany, New Zealand, Belgium (Flanders), Vietnam, Guatemala, Hungary, Turkey, and Japan. The reported studies are representative of most continents, except the African continent.
- Also, the measuring scales were applied to various contexts, samples or target groups, including measuring the behavioural intentions of school children, such as:
  - primary or elementary school children (e.g. Boewe-de Pauw & Van Petegem, 2013:563; Goodwin *et al*., 2010:398; Leeming *et al*., 1995:5);
  - middle school learners (e.g. Stevenson *et al*., 2013:3; Duerden & Witt, 2010:383; McBeth & Volk, 2010:56; Leeming *et al*., 1995:5);
  - high school learners (e.g. Michalos *et al*., 2012:225; Zsóka *et al*., 2013:133; Duerden & Witt, 2010:383; Boyes *et al*., 2009:667; Kaiser *et al*., 2007:245; Alp *et al*., 2006:213; Meinhold & Malkus, 2005:518; Leeming *et al*., 1995:5);

- university students (e.g. Zsóka *et al*., 2013:133; Levine & Strube, 2012:316; Milfont & Duckitt, 2010:82; Iwata, 2004:707) and
- adults (e.g. Goodwin *et al*., 2010:398; Milfont & Duckitt, 2010:82; Kaiser & Schultz, 2009:192; Mobley *et al*., 2010:431; Frick *et al*., 2004:1603; Maloney & Ward, 1973:584).

As the present study target population comprised secondary school learners (adolescents), the measuring scales that focused on this target group were further investigated.

For the present study, measures of pro-environmental behaviour were based on the actual commitment subscale of the CHEAKS (Leeming *et al*., 1995). The reasons for choosing the actual commitment subscale of CHEAKS were based on:

- CHEAKS was specifically developed for elementary, middle and junior high school learners (Leeming *et al*., 1995). Secondary learners in junior high school (grade 8–10) were the target group for the present study.
- Moreover, the scale has sound psychometric properties, proved to be a highly reliable and valid instrument and can be used in a variety of settings (Leeming *et al*., 1995) (section 4.4).

This section provided a summary of the scales used to measure actual pro-environmental behaviour, which was analysed to assist in choosing the most appropriate scale to use in the present study. Apart from the measurement scales reported in secondary literature, a synthesis of the findings based on the literature review of pro-environmental behaviour is provided in the section that follows.

3.6.3 Synthesis of findings from secondary literature on actual pro-environmental behaviour

A synthesis on the main findings from the secondary literature pertaining to actual pro-environmental behaviour is given next.

- The results reported in this section, from as early as 1973, suggest that most persons have a relatively high degree of verbal commitment, with lower levels of actual commitment. These findings indicate that most people say they are willing to do a great deal for the environment, but they actually do little for the environment (Maloney & Ward, 1973:585).

- Furthermore, it seems that people perceive various pro-environmental behaviours or actions as important for reducing global warming (Boyes *et al*., 2009:669) and being highly influential for preventing climate change (Zsóka *et al*., 2013:127). Similarly, findings from a survey of more than 4 000 young people (aged 11–16 years) from middle and secondary schools in England and Wales found that 81% believed that it was important to learn about global issues at school and that they needed to understand global matters in order to make choices about how they want to lead their lives (MORI 1998; in Goodwin *et al*., 2010:394). However, students were generally, for example, unwilling to give up traveling by car, although this was seen as essential to prevent climate change (Zsóka *et al*., 2013:127).
- Generally, the results indicated that the people exhibited moderately favourable environmental behaviour (Levine & Strube, 2012:316; Boyes *et al*., 2009:669). In a study conducted in Australia, results indicate that about half of the learners considered themselves to be 'very' or 'quite' environmentally friendly (Boyes *et al*., 2009:669). In the USA, it seems that many Americans perform environment-friendly activities quite frequently, for 85% reported that they frequently turn off lights and electrical appliances when not in use; 61% frequently tried to conserve water in their homes; and 59% said they frequently recycle newspapers, cans and glass (Coyle, 2005:35). These pro-environmental activities are, however connected to regular activities that are convenient to perform. Also, only a small number of people participated in activities that require more effort, such as a volunteer clean-up days (9%), and only 14% use other types of transportation, such as cycling or the bus, instead of driving in cars (Coyle, 2005:36).
- Moreover, a general finding of the research reported in this section, is that students would behave in an environmentally responsible manner only on a few occasions, when it requires minor changes in lifestyle, or little personal effort (Zsóka *et al*., 2013:127; Coyle, 2005:36; Yeung, 1998:252). This trend is also noticeable in a survey by Kagawa (2007) that find that students were most likely to undertake 'light green' activities (such as recycling, saving energy and water, using public transportation and buying organic, fair trade and healthy products)

which require minor changes in lifestyle. For example, typical activities which required little effort and inconvenience (such as switching off unused electrical appliances and recycling) were most frequently undertaken (Zsóka *et al*., 2013:127). However, for example, pro-environmental shopping-related activity is rare (74% never buy products with an environmental label, 71% do not pay attention to buying local products and 62% do not make efforts to reduce the use of disposable products) (Zsóka *et al*., 2013:133). The findings therefore indicate that high school students fail to make a connection between shopping habits and the state of the environment (Zsóka *et al*., 2013:133).

- The rate of adoption of environmentally friendly behaviour, which requires more active participation, was much lower than that for more general behaviour, which required only some sacrifices in comfort or convenience (Yeung, 1998:259). The frequency with which all students behave with greater concern for the environment than for personal comfort (54.0%) is greater than that associated with behaviour, which showed greater care for personal convenience (45.9%) (Yeung, 1998:261).
- In addition, it was found that environmental behaviour is different across age and cultural groups (Boeve-de Pauw & Van Petegem, 2013:551). The research suggest that younger learners appear to have a higher level of participation in pro-environmental behaviours that the older learners (Boeve-de Pauw & Van Petegem, 2013:551; McBeth & Volk, 2010:63).
- Boyes *et al*. (2008) state that environmental education has the highest potential for fostering behavioural change with activities (such as eating less meat or paying more for renewable electricity) where students have an (originally low) willingness to engage, but where willingness steeply increases along with the perceived utility of the action. Environmental education may influence students' pro-environmental behaviour in several ways, including the transfer of knowledge and values, as well as providing examples and shaping the school as a social setting.
- Furthermore, according to Duerden and Witt (2010), who explored the influence of direct (e.g. field experience) and indirect nature experiences (e.g. classroom activities) on environmental knowledge, attitudes and behaviour of learners in

the USA, find significant growth differences across time between the participant and comparison group on the all measures. It appears however, that the programme had the greatest influence on environmental knowledge, and a weaker effect on environmental behaviour (Duerden & Witt, 2010:385). Furthermore, Goodwin *et al*., 2010:408 apply an intervention programme aimed at changing environmental behaviour, and find that the intervention had a positive effect as the experimental groups experienced an increase in pro-environmental behaviour.

- In addition, the research reported here show that time outdoors is associated with improvement in behaviour scores (Stevenson *et al*., 2013:8). Results indicate improvement in behaviour scores of learners who spent time outdoors, and suggest that time spent outdoors was the most important positive predictor of change in the behaviour component (actual commitment) (Stevenson *et al*., 2013:5).
- The findings of Mobley *et al*. (2010:422) suggest reading environmental literature is a strong predictor of pro-environmental behaviour. Respondents who report higher levels of environmental reading, report higher levels of pro-environmental behaviour. This suggests that reading can help increase engagement in pro-environmental behaviour (Mobley *et al*., 2009:17).
- In addition, the NEETF/Roper data reported in Coyle (2005:43), show that the environmentally literate person is significantly more likely to engage in a set of pro-environment activities than someone who is not educated regarding the environment. High-knowledge respondents, when compared to low-knowledge respondents, were:
    - 10% more likely to save electricity in the home;
    - 50% more likely to recycle;
    - 10% more likely to purchase environmentally safe products; and
    - 50% more likely to avoid using chemicals in yard care.
- This data indicate that although the majority of, in this case the American public, support protection of the environment, their base of insufficient understanding often prevents them from taking appropriate environmentally-friendly actions.

Therefore, the more environmentally literate a person is, the more likely it is that they will act on behalf of the environment (Coyle, 2005:43).

This section concludes the discussion of the five components included in the 'conceptual literacy framework for sustainable avitourism' (see Figure 3.1): environmental and avi-orientation (including awareness and affinity), environmental and avi-knowledge, environmental and avi-values, behavioural intentions, and pro-environmental and avi-behaviour.

In the following section, the term 'behavioural involvement' of secondary school learners in the birding activity and avitourism is discussed. Environment-related or outdoor experiences, for example participating in birding activities or going on a birding tour, was found to have a positive effect on knowledge, attitude and a predisposition to action or responsible environmental behaviour (Hart & Nolan, 1999:7) and therefore could ultimately contribute to the sustainability of birds and the environment.

3.7 CONCEPTUALISATION OF BEHAVIOUAL INVOLVEMENT IN BIRDING AND AVITOURISM

This section outlines theoretical concepts related to the behavioural involvement of secondary school learners in birding and avitourism. In the following paragraphs, the researcher first outlines the definitions of behavioural involvement, and secondly summarises the measurement of behavioural involvement.

3.7.1 Defining behavioural involvement in birding and avitourism

'Involvement' can be defined in social-psychological and behavioural involvement terms (Havitz & Dimanche 1990:184; Stone in Kim *et al*., 1997:321). According to Kim *et al*. (1997:321), 'involvement' has "generally been defined in social-psychological terms". Havitz and Dimanche (1990:184) define 'involvement' in a tourism setting as "a psychological state of motivation, arousal or interest between an individual and tourism destination, at one point of time characterised by the perception of the following elements: importance, pleasure, value, sign, risk consequence and risk probability". 'Involvement' is also defined as "the level of perceived personal importance and/or interest evoked by a stimulus (or stimuli) within a specific situation" (Kotler & Keller, 2009:214; Antil, 1984:204). Another definition includes "a person's perceived relevance of the object based on inherent needs, values, and interests" (Solomon *et al.,* 2002:93; Zaichkowsky, 1985:342). However, others have argued that 'involvement' can be defined in behavioural terms (Kim *et al*., 1997:321).

'Behavioural involvement' (section 1.5.9) is defined as "time and/or intensity of effort expended on pursuing a particular activity" (Stone in Kim *et al.* 1997:321). Behavioural involvement in the context of leisure is described by measures such as ability or skill, number of memberships, frequency of participation, money or time spent, equipment owned, miles travelled and experience (Kim *et al*., 1997:321; Havitz & Dimanche, 1990:184).

For the purposes of this study, the term 'behavioural involvement' was taken from consumer behaviour literature and was applied to this study, focusing on birds and the natural environment in which birds live. In summary, 'behavioural involvement in birding and avitourism' refers mainly to:

- the level of perceived personal importance and/or interest evoked by a stimulus (or stimuli) within a specific situation, in this case birds and the natural environment;
- a psychological state of motivation, arousal or interest in birds and the natural environment;
- the perception of elements such as importance, pleasure, value, sign, risk consequence and risk probability of participating in the birding activity or avitourism;
- the amount of interest, arousal or emotional attachment evoked in a particular individual (i.e. secondary school learners) that could create a deep commitment to the product or activity, in this case birding activities and/or avitourism;
- the person's degree of involvement in birding activities or avitourism, which can be conceived as a continuum ranging from high to low; and
- the time and/or intensity of effort expended in pursuing birding activities or avitourism.

In the present study, behavioural involvement in birding and avitourism is defined as the level of perceived personal importance, interest and emotional attachment evoked by birds and the natural environment that could create a deep commitment to birding activity, which can be conceived as a continuum ranging from high to low.

The measurement of behavioural involvement of secondary school learners in birding activity and avitourism is discussed next.

3.7.2 The measurement of behavioural involvement

Determining the level of secondary school learners' involvement (low/high) in birding activity is useful for the examination and prediction of the learners' behaviour towards birds and the natural environment (Decrop, 2006:10; McGehee *et al*., 2003:308). A number of studies have reported findings in the secondary literature on the 'behavioural involvement' of avitourists.

A summary of factors measuring behaviour involvement for avitourists, as identified by various authors (Conradie & Van Zyl, 2016:10; Scott & Thigpen, 2003:208; La Rouche, 2003:13; Kim *et al*., 1997:321; McFarlane, 1994:364) is provided in Table 3.5.

Table 3.5: Summary of factors measuring behaviour involvement of avitourists

Conradie and Van Zyl (2016)	Scott and Thigpen (2003)	La Rouche (2003)	Kim et al. (1997)	McFarlane (1994)
Years involved in birding	Years involved in birding			
If they kept a bird life list	Number of birds on the bird life list	Whether they kept a bird life list		Number of species on the bird life list
Number of field guides owned	Number of field guides owned		Number of bird field guides owned	Number of birding books
Number of other bird books owned			Number of other bird books owned	
Number of subscriptions to birding magazines			Number of subscriptions to birding magazines	Number of birding magazine subscriptions
Number of memberships of birding organisations			Number of memberships of birding organisations	
	Number of birds able to identify by sight	The number of species they could identify	Number of birds able to identify by sight	Identification ability/ perceived skill level
	Number of birds able to identify by sound		Number of birds able to identify by sound	
Number of spotting scopes owned			Number of spotting scopes owned	Number of equipment items

Conradie and Van Zyl (2016)	Scott and Thigpen (2003)	La Rouche (2003)	Kim et al. (1997)	McFarlane (1994)
Number of binoculars owned			Number of binoculars owned	
			Number of times used a bird alert	
Number of birding trips in the last 12 months	Number of birding trips in the last 12 months		Number of birding trips in and outside of Texas	
Total number of days spent birding in the last 12 months	Total number of days spent birding in the last 12 months	Number of days spent birding	Number of days spent birding in and outside Texas	Days on outings or trips in the year
Total amount spent on birding in the last 12 months	Amount of money spent on birding		Amount of money spent on birding	
Distance travelled to go birding (km)	Total number of miles travelled to go birding		Total number of miles travelled to go birding	Farthest distance travelled on outings or trips in the year

Source: Conradie and Van Zyl (2016:10); Scott & Thigpen (2003:208); La Rouche (2003:13); Kim *et al.* (1997:321); McFarlane (1994:364)

Table 3.5 outlined typical measures of behavioural involvement in birding activities of avitourists. From the table, the following main categories measured are clear:

- number of years involved in birding;
- number of birds on the birders' life lists;
- reading behaviour and club membership of birders;
- birding equipment used for the identification of birds;
- behaviour of birders; and
- consumptive behaviour of birders.

These measures are considered in measuring the behavioural involvement of secondary school learners in birding activities and avitourism. 'Behavioural involvement' in birding and avitourism as applied in the present study refers to: involvement in birding activities by demonstrating access to birding materials, applications (books, bird lists and cell phone applications) and equipment (binoculars) as well as participation in birding courses, clubs, trips and activities.

Determining the level of a secondary learner's involvement (low/high) is useful in examining and predicting their behaviour (Decrop, 2006:10). Understanding the behavioural involvement of secondary school learners could assist educators and avitourism role players in making decisions and choices about appropriate birding activities, and could assist them in planning for a more enjoyable birding experience for this specific target group (Page, 2015:76; Pearce, 2005:6).

3.8 CONCLUSION

Chapter 3 represented *phase 2* of the methodological procedure (see Figure 1.2), comprising the presentation (see Figure 3.1) and a detailed discussion of the conceptual literacy framework for sustainable avitourism developed for the present study. This relates to the third secondary objective of the study, namely –

> To develop a conceptual literacy framework aimed at facilitating behavioural change within secondary school learners' behaviour towards birds, the natural environment and avitourism.

The conceptual literacy framework for sustainable avitourism was developed based on the literature review (*Phase 1*, Chapter 2) and consist of five components, representing the major categories and components (see Figure 2.9) that were identified in secondary literature to influence secondary school learners' behaviour towards birds, bird habitats and ultimately sustainable avitourism. A detailed discussion of each component of the 'conceptual literacy framework for avitourism' was provided in Chapter 3, achieving the second secondary objective of this study:

> To conceptualise sustainable avitourism, environmental and avitourism literacy, environmental and avi-orientation, environmental and avi-knowledge, environmental and avi-values, behavioural intention, actual pro-environmental and avi-behaviour, and involvement in avitourism from existing literature (sustainable avitourism and environmental and avitourism literacy were conceptualised in Chapter 2).

Each of the five components of the 'conceptual literacy framework for sustainable avitourism' was taken from the environmental education, environmental literacy and/or environmental psychology domains and was applied to the context of the present study, namely birds, the natural environment in which birds live and avitourism, thus contributing to the body of knowledge in the field of tourism management. A summary of the main findings from Chapter 3, for each component in the 'conceptual framework for sustainable avitourism' was provided:

- ‘Environmental and avi-orientation’ was defined as “the way in which an individual perceive the natural world, reflected in the general impression, consciousness about the importance and personal interest in birds and the natural environment in which birds live” (section 3.2.1). Based on the research of Larson, Green and Castleberry (2011:72), the CEPS was chosen to measure ‘environmental and avi-orientation’ for the present study (section 3.2.2).
- The term ‘environmental and avi-knowledge’, represents the cognitive category (see Figure 2.9) of the conceptual framework for sustainable avitourism and is defined as “an individual’s knowledge and ability to understand and evaluate the facts, information and principles relating to the sustainability of birds and the natural habitat in which birds live, the causes of environmental problems affecting birds and bird habitats, and possible social solutions to these environmental problems” (see section 3.3.1). Based on an analysis of 13 studies on the measurement of environmental knowledge (section 3.2.2), the knowledge subscale of the CHEAKS (Leeming *et al*., 1995) was chosen for the present study. A synthesis of the main findings in the secondary literature on environmental knowledge was given (section 3.2.3).
- ‘Environmental and avi-values’ represent the affective category (see Figure 2.9) of the conceptual framework for sustainable avitourism and was defined as “deeply rooted, abstract motivations that guide, justify or explain attitudes, norms, opinions and actions regarding birds and the natural environment” (section 3.4.1). Based on an analysis of 17 studies on the measurement of environmental attitudes and values (section 3.4.2), the 2-MEV scale was chosen for the present study. A synthesis of the main findings in the secondary literature on environmental values was provided in section 3.4.3.
- ‘Behavioural intention’ towards birds, the natural environment and avitourism also represent the affective category (see Figure 2.9) and was defined as

  > A learner’s perceived likelihood or subjective probability that he or she will engage in actual pro-environmental and avi-behaviour, how hard a learner is willing to try or how much effort the learners are planning to exert to perform a particular pro-environmental behaviour; and also the learners’ affirmation or verbal commitment that they intend to perform environmentally sustainable behaviour towards birds and bird habitats in the future (section 3.5.1).

Based on an analysis of 14 studies on the measurement of pro-environmental behavioural intention (section 3.5.2), the verbal commitment subscale of the CHEAKS (Leeming *et al*., 1995) was chosen for the present study. A synthesis of the main findings in the secondary literature on pro-environmental behavioural intention was given (section 3.5.3).

- 'Actual pro-environmental and avi-behaviour' refers to "behaviour that consciously seeks to minimise the negative influence of learners' actions on the natural and built world (for example, minimise resource and energy consumption that will support the existence of birds, reduce waste production to protect and save birds)" (section 3.6.1). To measure pro-environmental behaviour, the actual commitment subscale of the CHEAKS (Leeming *et al*., 1995) was chosen, based on an analysis of 20 previous research studies (section 3.6.2). A synthesis of the main findings in the secondary literature on pro-environmental behavioural was given (section 3.6.3).

Additionally, a sixth component 'behavioural involvement' of secondary school learners in the birding activity and avitourism was added, since outdoor activities and experiences (including birding activities or avitourism) was found to have a positive effect on knowledge, attitude and predisposition to responsible environmental behaviour and therefore could ultimately contribute to the sustainability of birds and the environment. Behavioural involvement was defined as

> The learner's time and/or intensity of effort expended in pursuing the birding activity. The degree of involvement in birding can be conceived as a continuum ranging from high to low (section 3.7.1).

To determine the typical measures of behavioural involvement, six studies were examined, and the main categories were used to measure secondary school learners' current involvement in birds and avitourism for the present study (section 3.7.2).

In the next chapter (Chapter 4), the researcher discusses the research design and method that was applied to obtain the primary research objective of the study.

CHAPTER 4: RESEARCH DESIGN AND METHOD FOR SUSTAINABLE AVITOURISM

4.1 INTRODUCTION

This chapter explains the research design and research method applied to this study in order to provide answers to the research objectives that were established to achieve the primary objective, namely

> To develop a literacy model for sustainable avitourism aimed at secondary school learners within Gauteng (South Africa).

The research was conducted in three phases, as illustrated in Figure 4.1.

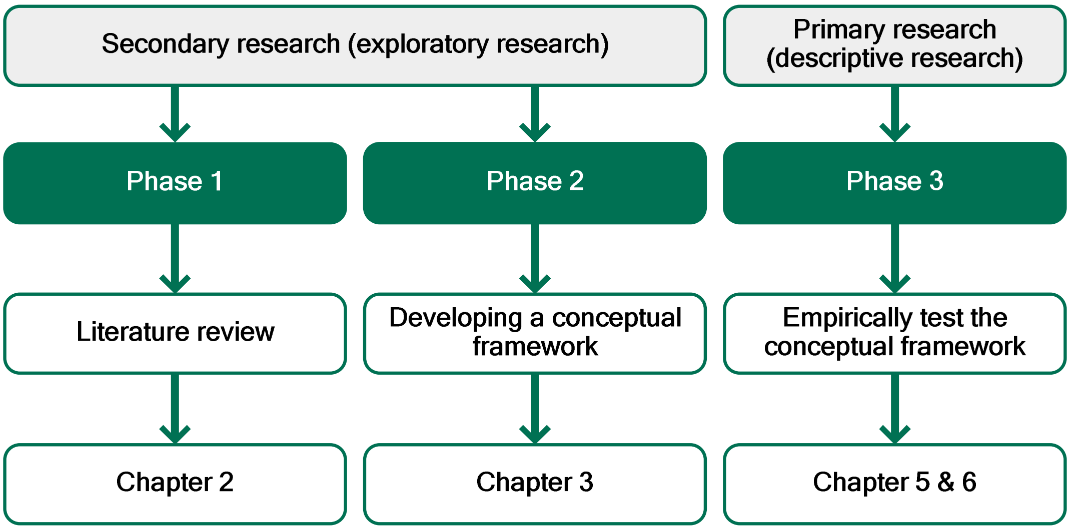


Figure 4.1: Methodological procedure of this study (including chapter outline)

The first two phases, illustrated in Figure 4.1, represent the secondary research (exploratory research) conducted for this study. In *phase 1*, outlined in Chapter 2, literature was reviewed to explore mechanisms and approaches aimed at facilitating behavioural change among secondary school learners regarding birds and the natural environment. Concepts from the environmental education and environmental literacy domain were applied to the current study. These 'environmental and avitourism literacy' concepts were conceptualised, and operational definitions were developed for the current study. In *phase 2*, presented in Chapter 3, ideas from the literature review were consolidated into a conceptual literacy framework for sustainable avitourism. In *phase 3*, the primary research conducted for this study, the components in the conceptual literacy framework for sustainable avitourism, were tested empirically.

This chapter focuses mainly on the primary research conducted at secondary schools in Gauteng, South Africa (*phase 3*). The research design was primarily a quantitative study, reflecting a positivist paradigm. The steps of the primary research process, from a quantitative perspective, are illustrated in Figure 4.2.

STEPS	PRIMARY RESEARCH PROCESS (QUANTITATIVE)	APPLICATION TO THE STUDY
STEP 1	Select a research design	Survey design (Quantitative cross-sectional survey)
STEP 2	Select and develop sampling plan	Multi-stage sampling approach Purposive sampling
STEP 3	Select and develop the research instrument	Self-administered questionnaire
STEP 4	Conduct a pilot test	A pilot-test was undertaken
STEP 5	Fieldwork: Data collection	Data collection at 17 secondary schools in Gauteng (SA)
STEP 6	Data processing	Data editing (cleaning), data coding and data capturing
STEP 7	Data analysis of results	Chapter 5 (Descriptive and factor analysis) Chapter 6 (SEM results)
STEP 8	Present conclusions and recommendations of the study	Chapter 7 (Conclusions and recommendations)

Figure 4.2: The primary research process

Source: Adapted from Aaker Kumar, Day & Leone (2011:71), Babbie, Mouton, Vorster and Prozesky (2007:98), Cooper and Schindler (2014:82–86), De Vos *et al.* (2012:74), Kumar (2011:21), Mouton (2001:47) and Neuman (2007:10 & 169)

Each step, as illustrated in the primary research process and its application to the current study, is discussed, starting with Step 1, the research design.

4.2 RESEARCH DESIGN OF THE STUDY

The research design is the blueprint or detailed plan for fulfilling the research objectives (Cooper & Schindler, 2014:82; Kumar, 2011:94). The research 'onion', as developed by Saunders, Lewis and Thornhill (2016:128), was used to explain the issues underlying the choice of data-collection techniques and analysis procedures in the research design. The research onion, as applied to the present study, is illustrated in Figure 4.3.

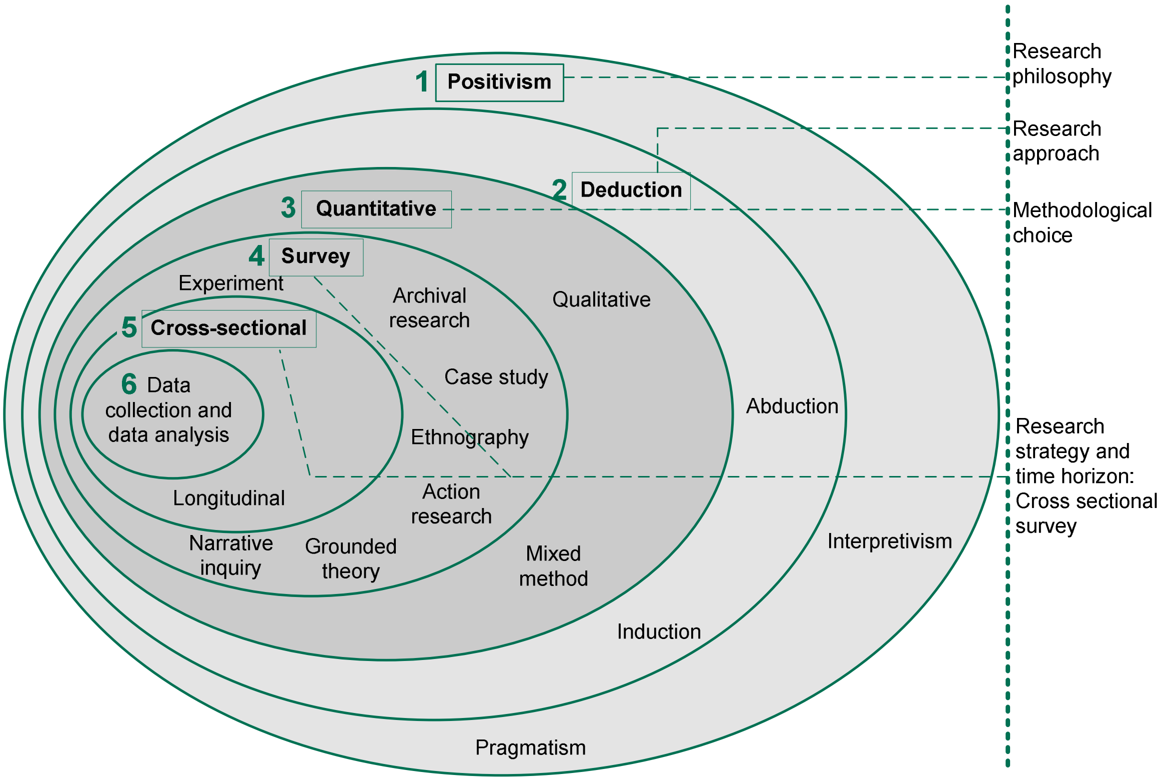


Figure 4.3: The research 'onion' underlying the research choices made in the current study

Source: Adapted from Saunders *et al.* (2016:124)

As illustrated in Figure 4.3, the (1) research philosophy used in this study reflects the principles of positivism.[26] Positivism sees social science as an organised method for combining deductive logic with precise empirical observations of individual behaviour in order to discover, confirm and predict general patterns of human activity (De Vos *et al.*, 2012:6; Neuman, 2007). A (2) deductive research approach occurs when the

[26] Positivism occupies the "philosophical stance of the natural scientist entailing working with an observable social reality to produce law-like generalisations. The emphasis is on highly structured methodology to facilitate replication" (Saunders *et al.*, 2016:678).

research starts with theory, developed from reading academic literature, and then designing a research strategy to test the theory (De Vos *et al*., 2012:48; Saunders *et al*., 2016:145). The current study applied deductive logic, as the literature review (p*hase 1*) was used to develop a conceptual framework (*phase 2*), which was tested empirically (*phase 3*) (see Figure 4.1).

In *phase 3* of the thesis, an empirical study was conducted, as the primary data[27] were collected by means of a quantitative cross-sectional survey. The (3) methodological choice[28] of the current study (in *Phase 3*) was therefore a quantitative research design. Quantitative research attempts precise measurement of something, for example quantitative methodologies usually measure behaviour, knowledge, opinions and attitudes (Cooper & Schindler, 2014:146) and are means for testing objective theories by examining the relationship between variables (Creswell, 2009:4). Quantitative research is principally associated with experimental and survey research (Saunders *et al*., 2016:168).

A (4) survey[29] (the research strategy)[30] was used in the current study, as it is a popular, common strategy used in business management research (Saunders *et al*., 2016:181) and according to Smith (2010:50), surveys are arguably the most common primary tourism data source. Survey research presents numerous advantages, providing a quick, often inexpensive, efficient and accurate means of assessing information about a population (Zikmund & Babin, 2010:191). The current study was a cross-sectional study[31] (5), as the secondary schools were visited only once. Measurement in this study took place only once and therefore causal factors could not be isolated or inferred, which, according to Salkind (2012), is a disadvantage of this type of design. A self-administered questionnaire (6) was developed for the purposes of this study.

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[27] Primary data are obtained from original research and consist of information collected by the researcher for the purposes of his or her own study (Welman *et al*., 2009:149).

[28] The methodological choice refers to choosing a qualitative, quantitative or mixed-method research design (Creswell, 2009:4; Saunders *et al*., 2016:165).

[29] A survey is "a structured set of questions or statements given to a group of people to measure their attitudes, beliefs, values, or tendencies to act" (Goodwin & Goodwin, 2014:392).

[30] Research strategy refers to "a general plan of how a researcher will go about answering the research questions" (Saunders *et al*., 2016:726).

[31] A cross-sectional study examines a snapshot of a single point in time and is carried out once (Neuman, 2007:17).

Furthermore, research generally has an exploratory, descriptive or explanatory (casual) purpose (Cooper & Schindler, 2014:124).

In *phase 1* of the current study (see Figure 4.1), exploratory research[32] was used, which was outlined in the literature review in chapters 2 and 3. Exploratory research is particularly useful to discover what is happening and to gain insight into a topic of interest (Saunders *et al*., 2016:174). In the first step of the exploratory research, secondary literature was obtained from previous research studies, as recommended by Cooper and Schindler (2014:130). Ideas from the relevant literature were synthesised and organised into the relevant themes in order to develop a conceptual framework (*phase 2*).

In *phase 3*, descriptive research[33] was used to answer who, what, when, where and how questions of the present study (cf. Tustin, Lighthelm, Martin & Van Wyk 2010:86). Descriptive research is therefore more structured with clearly stated hypotheses, investigative questions or research objectives (Cooper & Schindler, 2014:134).

The research design of the current study is summarised in Table 4.1 according to the descriptors used by Cooper and Schindler (2014:126).

[32] Exploratory research is used when one is seeking insights into the general nature of the problem, the possible decision alternatives and the relative variables that need to be considered (Aaker *et al*., 2011:72).

[33] Descriptive research is “research for which the purpose is to produce accurate representation of persons, events or situations” (Saunders *et al*., 2016:715).

Table 4.1: Descriptors of research design

Descriptor	Application to this study
Purpose of the study The most common and useful purposes of research are exploration, description and explanation	Exploratory research (*phases 1 and 2*) Descriptive research (*phase 3*)
Method of data collection	Survey Self-administered questionnaire
Researcher's control of variables The researcher's ability to manipulate variables	Ex post facto design was applied The researcher had no control over the variables and can only report what has happened or what is happening
The time dimension The study is carried out once or will be repeated over an extended period	Cross-sectional study The study was carried out once, as data were collected once at the secondary schools in 2014
The topical scope Describes the breadth and depth of the study	Statistical analysis
The research environment The research occurs under actual environmental conditions or a field setting	The fieldwork was conducted in 2014 at 13 secondary schools in Gauteng

Source: Adapted from Cooper and Schindler (2014:126)

After the research design had been selected, step 2 was to develop the sampling plan.

4.3 SAMPLING PLAN DESIGN

The four steps in designing the sample plan used in the present study are shown in Figure 4.4 and are discussed in this section.

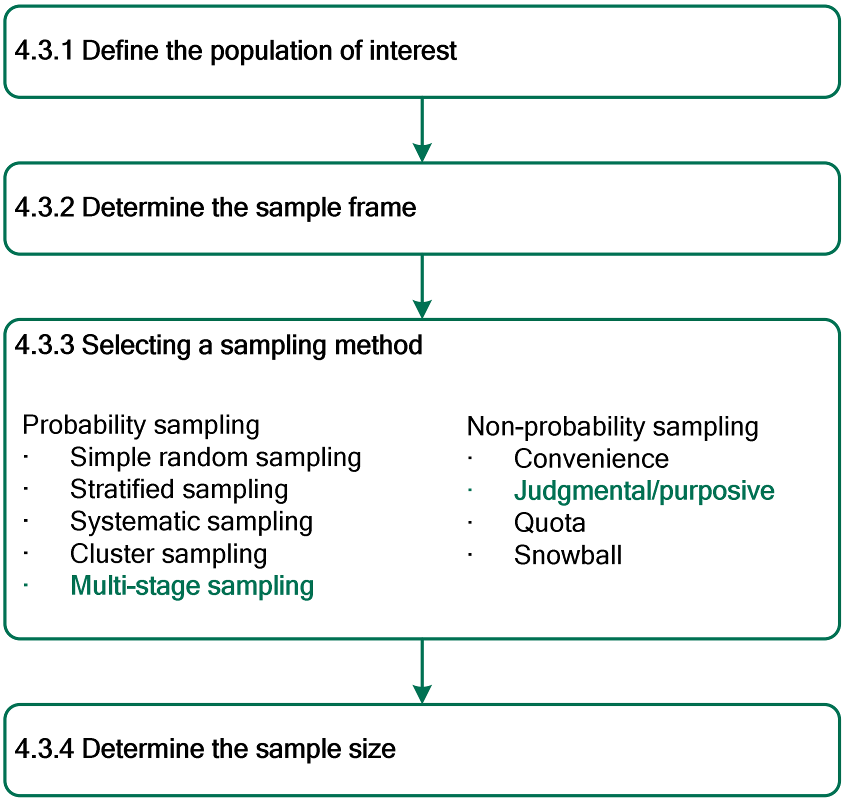

Figure 4.4: The steps in designing the sampling plan

Source: Adapted from Aaker *et al*. (2011:336), Malhotra (2015:272) and Tustin *et al*. (2010:339)

The sampling plan is discussed according to the steps illustrated in Figure 4.4.

4.3.1 Define the population of interest

A target population is the collection of elements that possess the information sought by the researcher, about which he or she wishes to make some inferences and from which the sample is selected (Babbie *et al*., 2007:174; Kumar, 2011:193; Malhotra, 2015:272). The survey population for the present study was secondary school learners in Grades 8 to 10 (aged 13–17) who attended secondary schools in Gauteng (South Africa) during July to October in 2014.

The survey population is described in terms of the sample units, sample elements, as well as the extent and time of conducting the survey (Tustin *et al*., 2010:340). In the current study, the sample frame (section 4.3.2) of school districts in Gauteng, listing all the secondary schools in Gauteng, represents the sampling units[34] available for

[34] A sampling unit refers to the basic level of investigation, containing the elements of the population to be sampled (Malhotra, 2015:272; Tustin *et al*., 2010:340).

selection. The sample elements included secondary school learners in Grades 8 to 10 (13–17 years old), selected from secondary schools in Gauteng.

The rationale for selecting secondary school learners in Gauteng was based on the following reasons: Although the smallest province in South Africa, Gauteng is the most populous province in the country with a population of 13.4 million (24.1%) in 2016 (see Appendix F1: Maps) (Statistics South Africa [Stats SA], 2016:23). Gauteng is inhabited by people of different cultural backgrounds from all the provinces of South Africa, representing the race groups and the 11 official languages spoken in South Africa (Stats SA, 2014:41). Gauteng is the economic heartland of South Africa and forms the main transit point for local and international tourists to southern Africa (Marais & Peacock, 2008:6).

In addition, Gauteng enjoys an exceptionally high bird diversity, boasting over 500 species, 450 of which occur regularly, while 117 of southern Africa's endemic and near-endemic species can be located in Gauteng (Marais & Peacock, 2008:6). Gauteng has been underrated as a birding destination due to its economic status and high population density, suggesting less wilderness and more environmental change than elsewhere in South Africa (Marais & Peacock, 2008:6). As explained earlier (see section 1.2), today's world is characterised by pervasive consumerism and people have formed habits to display social practices that are resource-intensive and involve negative impacts on the natural environment, including birds. Education has been earmarked as our best hope for solving our current environmental problems (Saylan & Blumstein, 2011:157; Urry, 2011:132; Van As *et al.*, 2012:412; Wheeler, 2012:123). Educating the youth in the present time is the key to providing the foundation of action for an equitable and sustainable world in the future (UNEP, 2017).

Secondary school learners in Grades 8 to 10 (13–17 years old) were selected for this study, as this age group represents the younger proportion of the youth (section 1.5.1). The current day school learners will have a major influence on the future state of the natural environment (including birds and bird habitat), which makes innovative ways of interactive learning and engagement at school level regarding environmental sustainability highly relevant. The learners of today are the responsible tourists, environmentally responsible business leaders, and environmental- and avitourism-literate citizens of tomorrow.

The researcher was not able to study the entire population and therefore selected a sample of the population. A sample is a subgroup of the population, in which the researcher is interested, selected for participation in the study (Kumar, 2011:193; Leedy & Ormrod, 2010:204; Malhotra, 2015:270). The sampling frame used for the current study is discussed next.

4.3.2 Identify the sample frame

A sampling fame is a representation of the elements of the target population and consists of a list or set of directions for identifying the target population (Malhotra, 2015:272). The Gauteng Department of Education (GDE, 2014) provided the sampling frame for the current study, which included a spreadsheet register of school districts in Gauteng, listing all the secondary schools in Gauteng (GDE, 2014).

4.3.3 Select a sampling method

The sampling method depends on the knowledge of the population in question, the objectives of the study, the available financial resources, time limits and the nature of the research problem (Blaxter, Hughes & Tight, 2010:165; McDaniel & Gates, 2012:276).

A multi-stage sampling approach, illustrated in Figure 4.5, was followed to identify secondary school learners in Grades 8 to 10 at secondary schools in Gauteng.

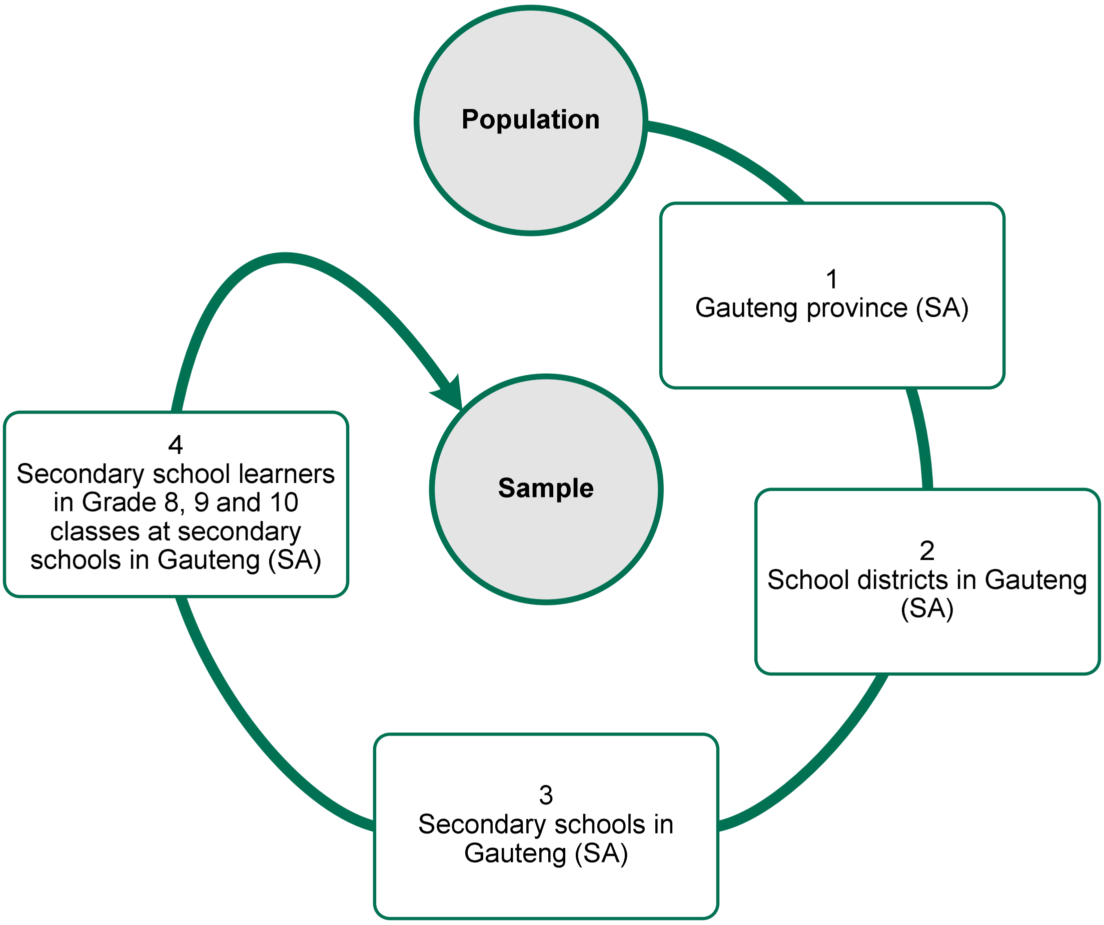

Figure 4.5: The multi-stage sampling approach followed in the current study

Source: Adapted from Erdoğan (2009:100) and Tustin *et al*. (2010:340)

Gauteng was selected according to the judgement of the researcher and experts in the field (section 4.3.1). The GDE provided the sample frame, consisting of a spreadsheet register of 15 school districts in Gauteng (see Appendix F2: Maps), listing the secondary schools (614) in Gauteng (GDE, 2014). Official permission from the GDE was obtained to conduct research among four school districts in Gauteng. From the sample frame (section 4.3.2), 20 secondary schools were purposively selected to ensure representivity of language, race and socio-economic circumstances. Grade 8, 9 and 10 learners (ages ranging from 13 to 17 years) were purposively selected due to the availability of the learners during the period of data collection.

Purposive sampling,[35] a non-probability sampling method,[36] enables researchers to select cases that will best enable them to achieve their research objectives (Saunders *et al.*, 2016:301), where the researcher selects sample members to fit some criterion (Cooper & Schindler, 2014:359). For the current study, a purposive sample was drawn based on the following criteria:

- The sample distribution should represent a wide geographical distribution within and between the four school districts in Gauteng.
- Respondents had to be learners in Grades 8 to 10 from secondary schools.
- Both male and female learners had to be included in the sample.
- The sample had to include learners of different cultural backgrounds and race groups and speaking the 11 official languages of South Africa.
- Respondents had to understand English, which was the language used in the questionnaire.

A total number of 17 secondary schools, from the four school districts, participated in the study. Self-administered questionnaires were made available to all learners in Grades 8 to 10. A census, was therefore taken of all the Grade 8, 9 and 10 learners at the invited secondary schools during the data-collection period.

Some limitations with regard to the sampling plan included that some schools were eliminated, as certain schools did not grant permission to conduct the research. Some reasons that were provided by school principals included full academic schedules or time constraints.

4.3.4 Determine the sample size

The sample size refers to the "number of elements to be included in a study" (Malhotra, 2015:274). Determining the sample size is complex and involves both statistical and practical considerations, including the following (Maholtra, 2015:274; Saunders *et al.*, 2016:279; Tustin *et al.*, 2010:359):

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[35] In purposive sampling, researchers rely on their judgement to deliberately obtain units of analysis in such a manner that the sample they obtain may be regarded as representative of the relevant population (Cooper & Schindler, 2014:359; Welman *et al.*, 2009:69).

[36] Non-probability sampling methods also have their own logic, can provide useful samples for social inquiry, and provide good estimates of the characteristics of the population (Babbie *et al.*, 2007:164).

- The degree of variability in the population – the more heterogeneous the population, the larger the sample size that is needed to capture the diversity
- The degree of precision associated with the population estimates based on the sample – the greater the precision required, the larger the sample size that is needed
- The degree of confidence associated with the population estimates – the level of certainty that the characteristics of the data collected represent the characteristics of the population
- The statistical data analysis to be used in the study – if advanced statistical techniques are required, the sample size should be larger
- The nature of the research – for exploratory research designs, the sample size is typically small, while for descriptive studies, larger samples are required
- Resource constraints – the sample should be guided by a consideration of resources, such as time and money
- The size of the target population from which the sample is drawn – the larger the absolute size of the sample, the closer its distribution will be to the normal distribution. This relationship refers to the central limit theorem.

For the purposes of this study, the guidelines of Cooper and Emory (1995:207) and Krejcie and Morgan (1970:608), which illustrate the relationship of sample size to total population, were used. These authors provide a method of determining the sample size needed to be representative of a given population. The table for determining sample size from a given population shows that for a population (N) of 1 000 000, the recommended sample size is 384 (Krejcie & Morgan, 1970:608).

The number of learners enrolled at secondary schools in Gauteng in 2014 was used as a guideline to determine an appropriate sample size (DBE, 2016:8–9). For the present study, based on 2014 figures, the total population (N), i.e. the number of secondary school learners (Grade 8, 9 and 10) enrolled in Gauteng, was 470 238 learners (DBE, 2016:8–9). Based on Krejcie and Morgan's (1970:608) work, the recommended sample size (n) of 384 seemed appropriate. For each school grade, a sample size was proportionately drawn from the population. Table 4.2 depicts the population and recommended sample size for Grade 8, 9 and 10 secondary school learners based on 2014 figures.

Table 4.2: Population and recommended sample size of secondary school learners according to school grade, based on 2014 figures

School grade	Population = N (2014)	Percentage distribution	Recommended sample size = n
Grade 8	142 693	30.34%	117 (384 x 30.34%)
Grade 9	153 074	32.55%	125 (384 x 33.3%)
Grade 10	174 471	37.11%	142 (384 x 37.11%)
Total	**470 238**	**100%**	**384**

Source: DBE (2016:8–9)

The information reported in this research study was collected from a total of n = 5 488 respondents (secondary school learners in Grades 8 to 10) in Gauteng during July to October in 2014. The actual sample size was substantially larger than the recommended sample size.

Recommendations regarding the sample size for the statistical data analysis to be used in the study were also considered. While there is little agreement among authors concerning how large a sample should be, when conducting a factor analysis, a larger sample size is recommended in general (Pallant, 2011:18). Tabachnick and Fidell (2007:613) reviewed this issue and suggest at least 300 cases for factor analysis. The sample size of the current study (n = 5 488) can therefore be considered suitable for factor analysis.

In general, structural equation modelling (SEM) requires a larger sample size than other multivariate approaches (Hair, Black, Babin & Anderson, 2014:573). According to Hair *et al*. (2014:576), the minimum sample size for a SEM model depends on several factors, including model complexities and communalities in each factor:

- SEM models containing five or fewer constructs, each with more than three measured indicators and with high item communalities (0.6 or higher), can be adequately estimated with samples as small as 100 to 150.
- For SEM models with a larger number of constructs, some having fewer than three measured indicators and with lower communalities, the sample size requirements may exceed 500.

Even though a sample size of n = 5 488 was obtained for the current study, model complexity and communalities were also investigated. It was concluded that the sample size was appropriate to conduct SEM. The sample size therefore met the requirements for further data analysis and model building.

After the sampling plan had been designed, the next step involved the development of the research instrument.

4.4 THE RESEARCH INSTRUMENT

Step 3 in the primary research process was to select and develop the research instrument. A self-administered questionnaire was used in this empirical study. A questionnaire for secondary school learners was developed to answer the research objectives and aim of the study, and to form the basis for the research findings and conclusions of the study (cf. Kumar, 2011:156).

A cover page was designed for the questionnaire to arouse the respondents' interest in participating in the study and to briefly introduce the researcher. The cover page described the aim of the study and stated that the survey was conducted with the permission of the GDE, school principals and school governing bodies (section 4.10). It was also indicated that all information collected from the secondary school learners (respondents) would be confidential. The respondents were also thanked for their participation in the study.

The questionnaire was developed to measure the six identified components (constructs), namely environmental and avi-orientation, behavioural involvement, environmental and avi-knowledge, environmental and avi-values, pro-environmental behavioural intention and pro-environmental and avi-behaviour of learners towards birds, the natural environment and avitourism. The constructs and items were based on the conceptual literacy framework for sustainable avitourism that was established in the literature review (section 3.1). Table 4.3 summarises the constructs, sections in the questionnaire, number of items and the measuring scale used to construct the final questionnaire (see Appendix A).

Table 4.3: Construction of the environmental and avitourism literacy questionnaire

Construct	Section of questionnaire		No. of items	Measuring scale
Biographic information 	A	Information about you	-	-
Environmental and avi-ortation 	B1	Interest in birds and their habitat	9	Adapted Children Environmental Perceptions Scale (CEPS) measuring environmental awareness and -affinity (Larson, Green & Castleberry, 2011)
Behavioural involvement 	B2	Involvement in birdwatching and avitourism	8	Adapted from Conradie and Van Zyl (2016:10); Scott & Thigpen (2003:208); La Rouche (2003:13); Kim, Scott and Crompton (1997:321); McFarlane (1994:364)
Environmental and avi-knowledge 	C	Environmental and avi-knowledge	10	Adapted from Children's Environmental Attitude and Knowledge Scale (CHEAKS) (Leeming, Dwyer & Bracken, 1995) Middle School Environmental Literacy Survey (MSELS) (McBeth, Hungerford, Marcinkowski, Volk, Cifranick, Howell & Meyers, 2011)
Environmental and avi-values 	D	Environmental and avi-values	20	Adapted two-dimensional model of ecological values (Bogner & Wiseman, 2006)
Pro-environmental behavioural intention towards birds, the natural environment and avitourism	E1	Behaviour: Intention 	16	Adapted from CHEAKS (Leeming *et al.*, 1995) MSELS (McBeth *et al.*, 2011)
Actual pro-environmental and avi-behaviour	E2	Behaviour and the environment 	11	Adapted from CHEAKS (Leeming *et al.*, 1995) MSELS (McBeth *et al.*, 2011)

The questionnaire was based on previous research instruments, as discussed in the literature review (see Chapter 3). Each section in the questionnaire is now discussed.

Section A determined the biographic information of the secondary school learners, including the respondents' gender, age, school grade, home language, race group and place of residence.

Section B1 contained questions on the respondents' awareness of and affinity towards birds and their natural habitat (avi-orientation) derived from similar research conducted by Larson, Green and Castleberry (2011:72) on environmental orientation. The purpose of their research was to construct and validate a survey instrument for assessing the environmental awareness and attitudes of children. Their research instrument, the Children's Environmental Perceptions Scale (CEPS), appeared to be a psychometrically sound instrument (Larson, Green & Castleberry, 2011:72). Eco-affinity and eco-awareness emerged as key components measured in the CEPS.

The current study used the CEPS as a guideline to measure awareness of and affinity towards birds and the natural habitat (avi-orientation). A Likert scale was used to rate the respondents' level of agreement or disagreement with each statement on a scale of 1 (strongly disagree) to 5 (strongly agree). The CEPS (Larson, Green & Castleberry, 2011:79) was adapted from general environmental items to specific items measuring the awareness of and affinity towards birds and the natural environment (see Appendix B: Pilot questionnaire; B1.1–B1.14). The CEPS scale originally consisted of 16 items, which were refined to 14 items before the pilot test, and to 9 items after the data of the pilot study were analysed. After the pilot study, data were analysed and the items B1.2, B1.4, B1.6, B1.7 and B1.12 were removed for the final questionnaire (see Appendix A: Final questionnaire). The adapted items from the CEPS scale are indicated in Table 4.4.

Table 4.4: Adapted items from the CEPS scale

2-CEPS scale		Adapted items pilot questionnaire	
Environmental orientation		**Environmental and avi-orientation**	
Item no.	**Item**	**Item no.**	**Item**
1	I like to learn about plants and animals	B1.1	I like to learn about **different bird species**

2-CEPS scale		Adapted items pilot questionnaire	
2	Plants and animals are important to people	B.1.2	**Birds** are important to people
3	I like to read about plants and animals	B.1.3	I like to read about **birds**
4	Plants and animals are easily harmed or hurt by people	B.1.4	**Birds** are easily harmed by people
5	I am interested in learning new ways to help protect plants and animals	B.1.5	I am interested in learning new ways to help protect **birds**
6	People need plants to live	B.1.6	People need **birds** to live
7	My life would change if there were no trees	B.1.7	My life would change if there were no **birds**
8	I would give some of my own money to help save wild plants and animals	B.1.8	I would give some of my own money to help save **birds**
9	I would spend time after school working to fix problems in nature	-	-
10	We need to take better care of plants and animals	B.1.9	People need to take better care of **birds**
		B.1.10	People need to take better care of **bird habitats (the areas where they live)**
11	I like to spend time in places that have plants and animals	B.1.11	I like to spend time in places **where birds live**
12	It makes me sad to see homes built where plants and animals used to be	B.1.12	It makes me sad to see homes built where **bird habitats** used to be
13	I like to learn about nature	B.1.13	I like to learn about **natural bird habitats**
14	I would help to clean up green areas in my neighborhood	B.1.14	I would **voluntarily** clean **parks** in my neighbourhood **to help birds**
15	Nature is easily harmed or hurt by people	B.1.15	-
16	My life would change if there were no plants and animals	B.1.16	-

Section B2 determined the behavioural involvement of secondary school learners in birding and/or in avitourism. To measure behavioural involvement in birding and avitourism, 11 binary questions were posed to secondary school learners. The learners affirmed their involvement in birding activities by demonstrating access to birding materials, applications (books, bird lists and cell phone applications) and equipment (binoculars) as well as participation in birding courses, clubs, trips and activities (see Appendix B, Pilot questionnaire; B2.1–B2.11).

Behavioural involvement in birding was addressed by the inclusion of questions derived from similar research conducted by various authors (Conradie & Van Zyl, 2016:10; Kim *et al*., 1997:321; La Rouche, 2003:13; McFarlane, 1994:364; Scott & Thigpen, 2003:208).

Kim *et al.* (1997:322) state that there is no standard scale used by leisure researchers to measure behavioural involvement and conducted an exploratory factor analysis (EFA) for behavioural involvement indicators. Consistent with Kim *et al*. (1997:330), the current research used reading behaviour and memberships, birding equipment for the identification of birds and birding behaviour to determine the behavioural involvement of secondary school learners in Gauteng (section 3.7.2).

The information on ownership and number of bird books (Question B2.1) was taken from previous research (Conradie & Van Zyl, 2016:10; Kim *et al*., 1997:321; McFarlane, 1994:364; Scott & Thigpen, 2003:208,). Question B2.11, enquiring whether learners have ever used a bird list to identify birds that they have seen, was derived from Conradie and Van Zyl (2016:10), La Rouche (2003:13); McFarlane (1994:364) and Scott and Thigpen (2003:208).

The questionnaire used in the pilot test originally consisted of 11 items, and was refined to 8 items after the data of the pilot study were analysed (see Appendix A: Final questionnaire, B2).

Section C was divided into three sections to measure the respondents' knowledge of birds, the natural environment and birding tourism.

In Section C.1, the basic knowledge of learners regarding birds was measured. Firstly, learners were requested to pair bird illustrations and family names correctly (see Appendix B: Pilot questionnaire; C1.1–C1.8). Secondly, using bird illustrations, learners were requested to identify bird species correctly from a multiple-choice bird species list (items C1.9 and C1.10). After the pilot study, the data were analysed and this section was not included in the final questionnaire. Because of the length of the pilot questionnaire, learners were not able to complete the questionnaires in the time provided to them.

Section C.2 of the questionnaire used the environmental knowledge subscale from the CHEAKS (Leeming *et al*., 1995) as a guideline to measure bird and environmental knowledge. Leeming *et al*. (1995) measured environmental knowledge using a five-point multiple-choice answer approach, allowing learners to select the correct answer from the listed choices. In the current study, learners' knowledge of birds and the environment in general was measured using the same approach. Some items included in the CHEAKS knowledge subscale were adapted for the current study (see Appendix B: Pilot questionnaire; C2.5–C2.9). These items are indicated in Table 4.5. After the pilot study, data were analysed and only C2.8 and C2.8 were used in the final questionnaire (see Appendix A: Final questionnaire; C5 and C6).

Table 4.5: Adapted items from the CHEAKS environmental knowledge subscale

Cheaks environmental knowledge subscale		Adapted items Pilot questionnaire	
Environmental knowledge		**Bird and environmental knowledge**	
Item no.	**Item**	**Item no.**	**Item**
7	Ecology is the study of the relationship between:	C2.5	Ecology is the study of the relationships between plants and animals and their environments. Which of the following would affect the ecology of birds most?
	1) different species of animals		1) Different bird species occurring together
	2) plants and the atmosphere		2) Mating between some bird species
	3) organisms and their environments		3) The presence of cattle
	4) man and other animals		**4) To destroy the habitat of birds**
	5) man and the environment.		5) The presence of birdwatchers
16	Animals alive today are most likely to become extinct because:	C2.6	A scarce bird (e.g. Cape Weaver) is most likely to become extinct (die out) in the area, because of:
	1) natural selection kills weaker animals		1) competition with other weavers
	2) where they live is getting too warm		2) warming of the area where they live
	3) they are unable to reproduce because of pollution		3) pollution limiting their reproduction
	4) the habitat where they live is destroyed		**4) the destruction of their habitat (the reedbeds where they live)**
	5) their food supply is destroyed by acid rain.		5) the limiting of their food supply due to acid rain.
18	Environmental problems are a threat to:	C2.7	Environmental problems are a threat to:
	1) mostly people in small countries		1) mostly water birds

Cheaks environmental knowledge subscale		Adapted items Pilot questionnaire	
	2) only people who live in cities		2) only pigeons living in cities
	3) only wild animals and endangered species		3) only endangered bird species
	4) mostly tropical plants and animals		4) mostly birds living in tropical areas
	5) all living things in the world.		**5) all living things in the world.**
23	Killing animals like wolves that eat others:	C2.8	Killing birds such as raptors/vultures that prey on other animals or eat meat from carcasses:
	1) is necessary and should be done		1) is necessary and should be done
	2) may increase the number of other animals		**2) may increase the number of other animals**
	3) does not affect other animals in the area		3) does not affect other animals in the area
	4) may decrease the number of other animals		4) may decrease the number of other animals
	5) will help protect the environment.		5) will help protect the environment.
28	A species that no longer exists is:	C2.9	The Dodo, a bird species that no longer exists, is:
	1) protected		1) protected
	2) endangered		2) endangered
	3) abundant		3) abundant
	4) extinct		**4) extinct**
	5) wild game.		5) wild game.

The other items in this section (items C2.1–C2.4 and C2.10–C2.13) also consisted of five-point multiple-choice questions. In this section, questions were developed to measure different aspects (or different topics) of birds and environmental knowledge, including:

- basic knowledge of birds in South Africa (items C2.1, C2.12);
- knowledge of learners regarding environmental problems affecting birdlife (items C2.2, C2.4, C2.6, C2.7, C2.9);
- basic knowledge of the bird's role in the environmental system (items C2.5, C2.8);
- action-specific environmental knowledge (items C2.11);

- basic knowledge of the natural habitat of birds (items C2.10); and
- knowledge of birding tourism and responsible behaviour when birding (items C2.3, C2.13).

The different aspects (or topics) of environmental knowledge covered in this section of the questionnaire were derived from previous literature, including Bögeholz (2006:74). After the data analysis of the pilot study, the questionnaire was refined, to finally include 10 items to measure bird and environmental knowledge. Items C2.5, C2.7 and C2.9 were not included in the final questionnaire.

In Section C3, a combination of bird illustrations and a bird habitat pictorial with multiple answers were used to test learners' ability to correctly interpret their bird knowledge related to the Tawny Eagle as elected bird species (see Appendix B: Pilot questionnaire; C3.1–C3.6). Environmental knowledge in this section was investigated as species knowledge (e.g. Tawny Eagle), ecological concepts (e.g. bird habitat) and system knowledge (e.g. the water cycle), according to the categories used by Bögeholz (2006:74). After the pilot study, the data were analysed and this section was not included in the final questionnaire.

In **Section D,** the ecological values of learners regarding birds and bird habitat were measured. The current study used the 2-MEV scale (Bogner & Wiseman, 2006) to measure bird and environmental values. After various scales were investigated (see 3.4.2) the 2-MEV was chosen for the current study, as it was designed to specifically tap into the environmental values of young people (Bogner & Wiseman, 2006:253; Johnson & Manoli, 2010:84). The 2-MEV scale was developed in Europe to measure adolescents' attitudes and to gauge the effectiveness of educational programmes (Bogner & Wiseman, 2006:253; Johnson & Manoli, 2010:84). Bogner and Wiseman (2006) aimed to quantify the 2-MEV (Bogner & Wiseman, 2002) using a questionnaire battery designed to measure environmental values, including the factors utilisation (U) and preservation (P). A questionnaire consisting of 45 items, on the basis of earlier analysis (Bogner & Wilhelm, 1996; Bogner & Wiseman, 2002), was administered to secondary school learners in Germany with the specific intent to extract the 10 best loading items of each domain, as recommended by Bogner and Wiseman (2006:249).

A five-point Likert scale ranging from ‘strongly agree’ to ‘strongly disagree’, with an ‘undecided’ category, was used in the research of Bogner and Wiseman (2006:249). Results from the maximum likelihood factor analysis yielded the two hypothesised orthogonal (uncorrelated) higher-order factors U and P. These analyses provided a basis for the construction of a questionnaire specifically designed to measure U and P. These authors regard the instrument as an important milestone towards the measurement of the environmental values of adolescents during the secondary/senior phase (Bogner & Wiseman, 2006:253).

The current study included 20 environmental and avi-value statements which the secondary phase learners were requested to rate using an agreement scale ranging from ‘strongly disagree’ (1) to ‘strongly agree’ (5). The items included in the 2-MEV were adapted for the current study (see Appendix B, Pilot questionnaire: Section D). These items are indicated in Table 4.6. After the pilot study, data were analysed and all items were retained in the final questionnaire (see Appendix A: Final questionnaire: Section D).

Table 4.6: Adapted items from the 2-MEV

2-MEV scale		Adapted items Pilot questionnaire	
Environmental values		Environmental and avi-values	
Preservation (P)			
Item no.	**Item**	**Item no.**	**Item**
1	I save water by taking a shower instead of a bath (in order to spare water)	D1	I save water **because it is important for the survival of birds**
2	I always switch the light off when I don’t need it	D2	**I save electricity because it could decrease air pollution, which endangers many bird species**
3	Humankind will die out if we don’t live in tune with nature	D3	**Various bird species** will die out if we do not live in tune with nature
4	I enjoy trips to the countryside	D4	I enjoy trips to the countryside **in order to observe birds in their natural habitat**
5	Sitting at the edge of a pond watching dragonflies in flight is enjoyable	D5	Sitting at the edge of a pond watching **birds** in flight is enjoyable
6	It is interesting to know what kinds of creatures live in ponds or rivers	D6	It is interesting to know what kinds of **birds** live **close to** ponds or rivers
7	Dirty industrial smoke from chimneys makes me angry	D7	Industrial smoke from **factories that kills birds** makes me angry

2-MEV scale		Adapted items Pilot questionnaire	
8	It upsets me to see the countryside taken over by building sites	D8	It upsets me to see **that bird habitats are destroyed to put up new buildings**
9	We must set aside areas to protect endangered species	D9	We must set aside areas to protect endangered **bird** species
10	Society will continue to solve even the biggest environmental problems	D10	Society must continue **trying** to solve even the biggest environmental problems **that affect birds**
Utilisation (U)			
11	Humans have the right to change nature as they see fit	D11	Humans have the right to change **natural bird habitats** as they see fit
12	We need to clear vegetation in order to grow crops	D12	We need to clear **bird habitats** in order to grow crops
13	We should remove garden weeds to help beautiful flowers grow	D13	We should remove garden weeds to help flowers grow
14	Our planet has unlimited resources	D14	Our planet has unlimited resources
15	Nature is always able to restore itself	D15	Nature is always able to restore itself
16	We must build more roads so people can travel to the countryside	D16	We must build more roads so that people can **easily** travel to the **natural attractions**
17	Our plants and animals of economic importance need to be protected	D17	Our plants, **birds** and animals **are of economic importance and** need to be protected
18	Worrying about the environment often holds up development projects	D18	Worrying about **birds** often holds up development projects **(e.g. building houses, shopping centres, etc.)**
19	People worry too much about pollution	D19	People worry too much about pollution
20	Human beings are more important than other creatures	D20	Human beings are more important than **birds**

Section E was divided into two sections to firstly measure the secondary school learners' intended behaviour (E1) and secondly their actual behaviour (E2) regarding birds, the natural environment and avitourism.

In **Section E1**, the pro-environmental behavioural intentions of secondary school learners regarding birds, the natural environment and avitourism were measured. Pro-environmental behavioural intentions provide an indication of how much effort the learners are planning or willing to exert to perform a particular pro-environmental behaviour for the benefit of birds, bird habitat and, in turn, avitourism (Ajzen, 1991; Bamberg & Möser, 2007; Wiernik *et al*., 2013:833).

For the current study, measures of pro-environmental behavioural intentions were based on the verbal commitment subscale of the CHEAKS (Leeming *et al*., 1995). The CHEAKS scale was specifically developed for elementary, middle and junior high school learners (Leeming *et al*., 1995). Moreover, the scale has sound psychometric properties and can be used in a variety of settings (Leeming *et al*., 1995). The verbal commitment subscale of the CHEAKS (Leeming *et al*., 1995), reflecting pro-environmental intentions, comprises 12 items that are sampled systematically from six content-dependent sub-domains, including animals, energy, pollution, recycling, water and general environmental issues. Only 10 items were adapted to measure the pro-environmental behavioural intentions of the learners regarding birds and bird habitat. These statements served as a proxy for the learners' willingness to try and motivation to act pro-environmentally. An additional 9 items (E1.11, E1.13 to E1.20) were added, measuring the pro-environmental behavioural intentions or willingness of the learners to participate in birding activities and avitourism.

Furthermore, Leeming *et al*. (1995) measured verbal commitment using a five-point Likert-type response format ranging from 'very true' to 'very false'. Following the CHEAKS, a semantic differential scale ranging from 'not at all true of me' to 'extremely true of me' was used to measure the learners' intended pro-avi- and environmental behaviours. Table 4.2 indicates the items included in the CHEAKS verbal commitment subscale and how these items were adapted for the current study (see Appendix B: Pilot questionnaire; Section E1). After the pilot study, data were analysed and items E1.10 to E1.12 were removed in the final questionnaire (see Appendix A: Final questionnaire, Section E1). The adapted items from the CHEAKS scale are outlined in Table 4.7.

Table 4.7: Adapted items from the CHEAKS verbal commitment (behavioural intention) subscale

CHEAKS verbal commitment (behavioural intention) subscale		Adapted items Pilot questionnaire	
Behavioural intention regarding the natural environment		**Behavioural intention regarding birds, bird habitat and avitourism**	
Item no.	**Item**	**Item no.**	**Item**
1	I would be willing to stop buying some products to save animals' lives	E1.1	I would be willing to stop buying some products to save **the lives of birds**

CHEAKS verbal commitment (behavioural intention) subscale		Adapted items Pilot questionnaire	
2	I would <u>not</u> be willing to save energy by using less air conditioning	E1.2	I **would be willing** to save **electricity if it could avoid killing birds**
3	To save water, I would be willing to use less water when I bath	E1.3	I would be willing to save water **because it is important for the survival of birds**
4	I would <u>not</u> give my own money to help the environment	E1.4	I **would be willing** to give my own money to **protect bird habitats**
5	I would be willing to ride the bus or walk to more places in order to reduce air pollution	E1.5	I would be willing to ride the bus or walk to more places **if it could save more birds**
6	I would not be willing to separate my family's trash for recycling	E1.6	I would be willing to separate my family's **rubbish** for recycling **if it could preserve bird habitats**
7	I would give my own money to help protect wild animals	E1.7	I would **be willing** to give my own money to help protect wild **birds**
8	To save energy, I would be willing to use dimmer light bulbs	-	No item
9	To save water, I would be willing to turn off the water while I wash my hands	E1.8	I would be willing to turn off the water while I wash my hands **if it could preserve bird habitats**
10	I would be willing to pass out environmental information	E1.10	I would be willing to **share** environmental information t**o inform people about birds and their habitats**
11	I would be willing to write letters asking people to help reduce pollution	-	No item
		E1.11	I would be willing to motivate people to support environmentally responsible birding tours
12	I would be willing to ask people who don't recycle to start doing so	E1.12	I would be willing to **explain to people who do not recycle how it could help birdlife**
		E1.13	I would be willing to motivate people to support environmentally responsible birding tours
		E1.14	I am willing to buy a bird book to assist me in identifying birds
		E1.15	I am willing to buy a bird book to learn more about birds and bird habitats
		E1.16	I am willing to talk to my teachers about a bird club at school
		E1.17	I am willing to join a local birdwatching club

CHEAKS verbal commitment (behavioural intention) subscale		Adapted items Pilot questionnaire	
		E1.18	I would be willing to put up a bird house or a bird feeder near my home
		E1.19	I would be willing to go on a birdwatching tour in my area
		E1.20	I would be willing to go on a birdwatching tour in a nature reserve

In **Section E2,** the actual pro-environmental behaviour of secondary school learners regarding birds, the natural environment and avitourism was measured. For the current study, measures of pro-environmental behaviour were based on the actual commitment subscale of the CHEAKS (Leeming *et al*., 1995). The actual commitment subscale of the CHEAKS (Leeming *et al*., 1995), reflecting pro-environmental behaviour, comprises 12 items that are also, as the verbal commitment scale discussed above, sampled from six sub-domains, namely animals, energy, pollution, recycling, water and general environmental issues. To measure the actual pro-environmental behaviour of learners regarding birds and bird habitat, seven items of the CHEAKS were adapted to the birding context. An additional seven items (E2.8–E2.14) promoting pro-environmental and avi-behaviour were formulated to measure the actual behaviour of learners to participate in birding activities and avitourism. These statements featured avitourism facets that provide environmental benefits to communities and help to educate learners about the value of birds and biodiversity as well as the protection and preservation of birds' natural habitat. More specifically, the series of statements intended to identify the prevalence of 'avitourists' or 'birders' among learners who supposedly should be well educated and have high levels of ecological knowledge and greater awareness of bird conservation issues. Finally, the impact-oriented focus adopted by the study on the actual environmental impact of learner behaviours enabled the identification of targeted behaviours among learners that significantly influence the environment in which birds live.

Furthermore, Leeming *et al*. (1995) measured actual commitment to the natural environment using a five-point Likert-type response format ranging from 'very true' to 'very false'. Due to the differences in the degree of regularity of actual pro-environmental behaviour, a scale, ranging from 'never' to 'always', was used for the current study. Therefore, the self-reported behaviour of learners, who claimed to never, seldom, sometimes, often or always act according to the behavioural descriptors were measured. Table 4.8 firstly indicates the items included in the CHEAKS actual commitment subscale and how these items were adapted for the current study, and secondly the additional items added (see Appendix B: Pilot questionnaire; Section E2). After the pilot study, data were analysed and items E2.3, E2.9 and E2.10 were removed in the final questionnaire (see Appendix A: Final questionnaire, Section E2).

Table 4.8: Adapted items from the CHEAKS actual commitment (actual behaviour) subscale

CHEAKS actual commitment (actual behaviour) subscale		Adapted items Pilot questionnaire	
Actual behaviour to the natural environment		**Actual pro-environmental and avi-behaviour**	
Item no.	**Item**	**Item no.**	**Item**
1	I have **not** written to someone about a pollution problem	E2.1	I **have talked** to someone about pollution **that causes destruction of bird habitats**
2	I have talked with my parents about how to help with environmental problems	E2.2	I have talked to **someone** about how to **limit environmental problems that affect bird habitats**
3	I turn off the water in the sink while I brush my teeth to conserve water	E2.3	I **do** turn off the water while I brush my teeth to conserve water **because it is important for the survival of birds**
4	To save energy, I turn off lights at home when they are not in use	-	No item
5	I have asked my parents not to buy products made from animal fur	E2.4	I have asked **someone** not to buy products **that can cause harm to birds**
6	I have asked my family to recycle some of the things we use	E2.5	I have asked **someone** to recycle some of the things we use t**o limit production of waste that is bad for birdlife**
7	I have asked others what I can do to help reduce pollution	E2.6	I have asked others what I can do to help **create a healthy environment that is good for birdlife**
8	I often read stories that are mostly about the environment	E2.7	I read stories that are mostly about **birds**
9	I do not let a water faucet run when it is not necessary	-	No item
10	I leave the refrigerator door open while I decide what to get out	-	No item
11	I have put up a bird house or a bird feeder near my home	-	No item

	CHEAKS actual commitment (actual behaviour) subscale		Adapted items Pilot questionnaire
12	I do not separate things at home for recycling	-	No item
		E2.8	I have talked to someone about a birdwatching club at school
		E2.9	I throw rubbish out of the window while driving with someone
		E2.10	I feed birds in our garden
		E2.11	I have visited a bird park
		E2.12	I have been on a birdwatching tour in a nature reserve
		E2.13	I have visited the local zoo to learn more about birds
		E2.14	I have visited the local museum to learn more about birds

4.5 PILOT TESTING

Pilot testing, or pre-testing, is an integral part of instrument construction (Kumar, 2011:24). For the purposes of this study, the following approach was followed.

The questionnaire was subjected for review by to two experts in the field of ornithology (Dr A Kemp, ornithologist, and Mr F Peacock, ornithologist and then curator of the ornithology section of the Ditsong natural and cultural history museum in South Africa) and to a language editor before the pilot study was conducted (Kemp, 2014; Peacock, 2014). Minor modifications were implemented on the basis of their recommendations, after which the questionnaire for the study was pre-tested.

The questionnaire for the pilot test was distributed to a research population comprising secondary school learners in Grades 8 to 10 during June to July 2014. Table 4.9 summarises the number of constructs and items included in the pilot questionnaire.

Table 4.9: Research constructs, sections in the questionnaire and number of items in the pilot questionnaire

Construct	Section of questionnaire		No. of items	Type of question
Biographic information	A	Information about you	-	Question A1-5: Closed-ended Question A6: Open-ended
Environmental and avi-orientation	B1	Interest in birds and their habitat	14	Closed-ended
Behavioural Involvement	B2	Involvement in birdwatching and avitourism	11	Closed-ended
Environmental and avi-knowledge	C	Bird and environmental knowledge	29	Closed-ended
Environmental and avi-values	D	Environmental and avi-values	20	Closed-ended
Pro-environmental behavioural intention towards birds, the natural environment and avitourism	E1	Behaviour: Intention	19	Closed-ended
Actual pro-environmental and avi-behaviour	E2	Behaviour and the environment	14	Closed-ended
Total			107	

This pilot study was conducted among a sample of secondary school learners (n = 367) in Gauteng. Two different schools were identified to participate in the study. One school was located in Johannesburg and predominantly English-speaking, while the other was located in Pretoria and predominantly Afrikaans-speaking. When the data of the pilot test were analysed, the biographic profiles for the participating learners showed a fairly equal sample distribution between gender (boys, 50.40%; girls, 49.60%) and school grade levels (Grade 8, 34.0%; Grade 9, 30.7%; Grade 10, 35.4%). An equal number of learners were sampled for the two participating schools. Furthermore, the average age of learners ranged between 14 and 15 years. Approximately half of the learner sample was black Africans, of whom the majority of home languages were Zulu, Sesotho, Tswana or Pedi. Conversely, just more than a third of the learners were white, with Afrikaans and English as their home languages.

To construct the final questionnaire, the data analysis based on the pilot test as well as the feedback with respect to the interpretation of the participating secondary school learners of the questionnaire was taken into account. It was realised that the questionnaire was slightly too lengthy to complete in the allocated time and it was observed that the school learners became tired at the end of the questionnaire. Based on the outcome of the data analysis, some items were therefore removed for the final questionnaire and are discussed next.

In Section A, Question 4, “What is your home language?”, some learners stated that they speak more than one language at home. For clarity purposes, the statement “The language that you speak most at home” was therefore added in the final questionnaire.

To shorten the questionnaire, the data of the pilot study were analysed and items B1.2, B1.4, B1.6, B1.7 and B1.12 were removed for the final questionnaire (see Pilot questionnaire, section B1). In addition, in Section B2 of the questionnaire, items B2.6, B2.7, B2.10 and B2.11 were removed for the final questionnaire.

After the pilot study, the data were analysed and Section C1 was not included in the final questionnaire. After the data analysis of the pilot study, the questionnaire was refined to finally include 10 items to measure bird and environmental knowledge. In Section C2, items C2.5, C2.7 and C2.9 (in the pilot questionnaire) were not included in the final questionnaire. A few additional changes were made based on the outcome of the data analysis. Item C2.1, the multiple-choice question, was found to be too easy, as the majority of learners answered correctly. The question “The national bird of South Africa is the …” with different bird names as options to choose was adapted to pictures of different birds, so that the learners could rather identify the national bird. Items C2.3 and C2.10 were also changed slightly. Because the questionnaire was too lengthy, Section C3 was also removed for the final questionnaire.

After the pilot study, data were analysed and all items in Section D were retained in the final questionnaire.

Similarly, because the questionnaire was too lengthy, items removed in Section E1 included items E1.10, E1.11 and E1.12, while items removed in Section E2 included items E2.3, E2.9 and E2.10.

The fieldwork and data-collection procedure are discussed in the next section.

4.6 FIELDWORK: DATA COLLECTION

Step 5 in the research process was to conduct the fieldwork for the study.

The secondary schools selected in which to distribute questionnaires were based on the sampling plan, as well as the permission that was granted by the GDE, school principals and school governing bodies. Self-administered questionnaires were distributed to learners in Grades 8, 9 and 10 at 17 secondary schools in four Gauteng school districts. The school principal or relevant teacher provided an indication of the number of questionnaires that had to be provided to each school. The correct numbers of questionnaires were packed according to the number of learners in each school grade. Based on individual arrangements per school and the availability of the school learners, the questionnaires were distributed to Grade 8, 9 and 10 learners. The researcher and fieldworkers (teachers of participating schools) conducted the fieldwork. The fieldworkers were asked to read the cover page to the learners and to explain the following to the participating learners:

- The aim of the research
- Confidentiality of the information provided by the respondents
- Instructions to complete the questionnaire.

The frequencies of respondents secondary school learners) from the 17 secondary schools are indicated in Table 4.10.

Table 4.10: Participating secondary schools in Gauteng

Gauteng school district	Frequency	Secondary school	Frequency
District A	1 262	School 1	323
		School 2	158
		School 3	517
		School 4	264
District B	1 133	School 5	224
		School 6	311
		School 7	79
		School 8	362
		School 9	157
District C	1 456	School 10	139
		School 11	425
		School 12	406

		School 13	486
District D	1 637	School 14	754
		School 15	362
		School 16	255
		School 17	266
Total	**5 488**	**Total**	**5 488**

The names of school districts and secondary schools were not disclosed to adhere to ethical principles. Once data have been collected, the researcher has to transform the 'words' used in the questionnaire to the only format suitable for quantitative analysis – numbers (Denscombe, 2007:257). This involves processing the data, which is discussed in the next section.

4.7 DATA PROCESSING

Data processing (Step 6 in the research process) entails editing, coding and capturing data.

Data editing involved examining all completed environmental and avi-literacy questionnaires in order to identify and minimise errors, incompleteness and misclassification, as recommended by Cooper and Schindler (2014:377) and Kumar (2011:255). After data collection, only 18 questionnairs were spoilt and could not be used in the data analysis. Data coding (pre-coding) involved the assignment of respective codes to categories, and these numbers were built into the design of the questionnaire (cf. Cooper & Schindler, 2014:379; Denscombe, 2007:258). Data in this format are then ready for capturing.

The data-capturing process involved constructing a code for each variable in the questionnaire, and data typists from Datanet, a data-capturing company, entered the raw data into a database. Data capturing converts the information gathered into a medium suitable for viewing and manipulation (Cooper & Schindler, 2014:380).

Once the data had been captured and cleaned, the data were analysed using the Statistical Package for the Social Sciences (SPSS 23.0), a statistical computer package. The statistical data analysis used in the study is discussed in the next section.

4.8 DATA ANALYSIS

Data analysis (Step 7 in the research process) means the categorising, ordering, manipulating and summarising of the data to an interpretable form in order to study and test relations and draw conclusions (De Vos *et al*., 2012:249). The statistical analysis is outlined in the following order: Firstly, cleaning and validation of the data are discussed. Secondly, the profile of the data obtained through descriptive statistics is provided. Thirdly, the validity and reliability of the research instrument are discussed. Lastly, statistical methods used in this study are explained.

4.8.1 Cleaning and validation of the data

Data validation is the process of ensuring that the data are clean, correct and useful (Camira Statistical Consulting Services, 2009:25). The types of variables and level of measurement dictate the statistical techniques used in analysing the data (De Vos *et al*., 2012:250). The level of measurement, its description, method of validation and application to the avi-literacy questionnaire are depicted in Table 4.11.

Table 4.11: Level of measurement and method of validation

Measurement level	Description	Method of validation	Application to questionnaire
Nominal	Classify into categories	Calculate frequencies	Question A-1 Question A-3 Question B-2 (Yes/No) Section C (Correct/Incorrect)
Ordinal	Order by rank or magnitude	Calculate frequencies	Section B-1, D, E1, E2
Interval	Categories are ranked on a scale Distance between values is meaningful, but without an absolute zero	Calculate means, standard deviations, skewness and kurtosis Determine maximum and minimum values	-
Ratio	Categories exist on a scale Distance between values is meaningful, and there is an absolute zero point	Calculate means, standard deviations, skewness and kurtosis Determine maximum and minimum values	Question A-2

Source: Adapted from Blaxter *et al*. (2008:217); Camira Statistical Consulting Services (2009:25), Cooper and Schindler (2014:250), De Vos *et al*. (2012:250) and Denscombe (2007:255–256)

Frequencies and means of the raw data were checked for any discrepancies in the data. Cleaning the data involved determining whether any invalid numbers appeared in a column (such as a 3 in the Male (1) and Female (2) columns). A cleaned database was created and stored for data analysis. The descriptive statistics used are discussed in the next section.

4.8.2 Descriptive statistics

Descriptive statistics are used to describe the characteristics of the sample taken (Leedy & Ormrod, 2010:187). The presentation of frequencies,[37] measures of location[38] and measures of spread (standard deviation)[39] are used to describe the outcome of a study (Cooper & Schindler, 2014:401; Collis & Hussey, 2003:198). Frequencies, means and standard deviations were used to describe characteristics in the present study. Graphs and tables were created and are interpreted in Chapter 5 (sections 5.2 and 5.3). The validity and reliability of the questionnaire are discussed next.

4.8.3 Validity and reliability of the research instrument

A valid and reliable research instrument leads to appropriate conclusions from the data and will therefore solve the research problem in a credible fashion (Leedy & Ormrod, 2010:91).

The validity of a measurement instrument is the ability of the instrument to measure what it is designed to measure (Leedy & Ormrod, 2010:28) or the extent to which the measure truthfully represents a concept (Quinlan, Babin, Carr, Griffin & Zikmund, 2015:24). In the current study, content analysis and statistical evidence were used to establish the trustworthiness of the results. Content validity was established in that two ornithologists (section 4.6) examined the questionnaire, and their recommendations were implemented. Moreover, the questions were based on literature and previous

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[37] Frequencies are numerical values that represent the total number of observations for a variable under study, and a frequency distribution is an array of frequencies arranged in size order in a table, chart or graph (Collis & Hussey, 2003:199).

[38] Measures of central tendency, often called 'location', include the mean (the average), median (the middle value) and mode (the most frequently occurring value) (Collis & Hussey, 2003:212; Cooper & Schindler, 2014:400).

[39] Standard deviation, the most frequently used measure of spread, summarises how far from the average the data values are (Cooper & Schindler, 2014:401).

measurement scales used (section 4.4). To establish validity with statistical evidence, a factor analysis was performed. Factor analysis is a statistical measure used to describe variability among variables in terms of fewer unobserved variables, called factors, and was performed per section of the questionnaire (Camira Statistical Consulting Services, 2009:21). Confirmatory factor analysis (CFA) was applied for sections B1 and D of the questionnaire, which were not newly developed but derived from similar research conducted previously (section 4.8.6a). EFA was done for sections B1, D, E1 and E2. The CFA conducted for sections B1 and D did not show acceptable fit, and therefore an EFA was conducted to explore the underlying structure of the data. Based on the two approaches discussed, it can be concluded that the research instrument used for this study was valid.

Reliability is the extent to which the measuring instrument yields consistency and stability of results, to the degree to which the research can be repeated while obtaining consistent results (Leedy & Ormrod, 2010:93; Quinlan *et al*., 2015:24). This study used internal consistency[40] to measure the reliability of the questionnaire. An item analysis was performed on the questions in sections B, C, E, F, G and I to determine Cronbach's alpha[41] values in order to test the reliability of the questionnaire (reported in section 5.4).

In the next section, the statistical methods used in the present study are discussed.

4.8.4 Statistical methods used in this study

The multivariate statistical an analysis[42] used in this study included both factor analysis[43] and modelling, as illustrated in Figure 4.6.

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[40] Internal consistency represents "a measure's homogeneity or the extent to which each indicator of a concept converges on some common meaning" (Quinlan *et al*., 2015:113).

[41] Cronbach's alpha is "the degree to which the instrument items are homogeneous and reflect the same underlying constructs" (Cooper & Schindler, 2014:260).

[42] Multivariate statistical analysis refers to "statistical techniques that simultaneously analyse multiple measurements on individuals or objects under investigation, thus any simultaneous analysis of more than two variables" (Hair *et al*., 2014:4).

[43] Factor analysis is a multivariate interdependence technique that statistically identifies a reduced number of factors from a larger number of measured variables (Aaker *et al*., 2011:489; Zikmund & Babin, 2010:625).

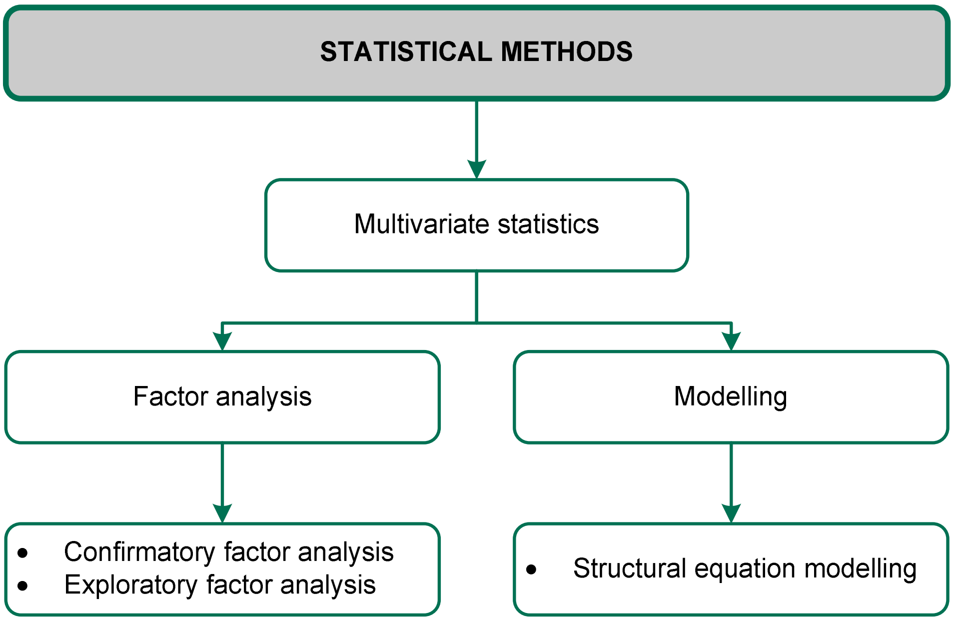

Figure 4.6: Multivariate statistics used in the study

Factor analysis is a multivariate interdependence technique that statistically identifies a reduced number of factors from a larger number of measured variables (Aaker *et al*., 2011:489; Zikmund & Babin, 2010:625). Factor analysis techniques can achieve their purposes from either an exploratory or a confirmatory perspective (Hair *et al*., 2014:92; Zikmund & Babin, 2010:625). Both EFA and CFA were used in the study. The outcome of the EFA was data summarisation, which was achieved by defining a small number of factors that adequately represent the original set of variables (cf. Hair *et al*., 2014:96). The factors/constructs that were derived from the EFA were then used in SEM.

The statistical methods, CFA, EFA and SEM, as applied in this study, are discussed in the paragraphs below. Testing for moderation in SEM is also discussed.

a. Confirmatory factor analysis

CFA is “a form of factor analysis in which dimensions are defined according to the specification of a substantive theory” (Bernstein in Reinard, 2006:404), “conducted to confirm theories about the factors one expects to find” (Vogt in Reinard, 2006:428). The CFA statistics therefore show how well the theoretical specification of latent factors matches reality (the actual data) (Hair *et al*., 2014:603). CFA is therefore an enabling tool that either confirms or rejects the preconceived theory (Hair *et al*., 2014:603).

CFA was employed to test whether the categories found in exploratory research on general environmental orientations in Section B1 (Larson, Green & Castleberry, 2011:79) and environmental values in Section D (Bogner & Wiseman, 2006:253) could be confirmed in this study. The purpose of the CFA analysis was to evaluate whether the dimensions suggested by previous research could fit the data of this study. The analysis of moment structures (AMOS) (SPSS 23.0) was used as the statistical software for conducting the CFA.

The following procedure was used in performing the CFA (cf. Raykov & Marcoulides, 2000:95):

- The variables representing factors in the literature, which had been measured using a Likert scale in sections B1 and D of the questionnaire, were tested using CFA.
- With respect to the CFA models, learners' 1) avi-affinity (Section B1) and 2) avi-values (Section D), a confirmatory approach[44] was used, in which a model was postulated and evaluated. The model was initially presented according to the theory. The model was tested for consistency with the observed data using an SEM-type approach. The estimates of each parameter[45] of the measurement model were reported.
- The model was then evaluated on the basis of goodness-of-fit indices to test whether the proposed model fitted the data.

In the SEM literature, a number of goodness-of-fit indices, which reflect the extent to which a model can be considered an acceptable means of data representation, are suggested. The following goodness-of-fit indices were used in this study (cf. Hair *et al.*, 2014:576–580; Raykov & Marcoulides, 2000:35–41):

- Chi-square value (CMIN): This represents a test statistic of the goodness-of-fit model, and is used when testing the null hypothesis to establish whether the model fits the analysed covariance matrix perfectly. 'Chi-square value' is defined as $T = (N - 1) F_{\min}$, with N the sample size and $F_{\min}$ the minimal value of the fit function for

[44] A strictly confirmatory approach is not concerned with discovering a factor structure, but with confirming the existence of a specific factor structure. This approach is rare in practice, as researchers are not willing to reject a proposed model without suggesting an alternative (Raykov & Marcoulides, 2000:95).

[45] Parameters are coefficients expressing relationships among elements of the model (Reinard, 2006:434).

the parameter estimation method used. The model is rejected when the p-value is smaller than a pre-set significance value.

- Degrees of freedom (df): The use of degrees of freedom follows Popperian logic (Popper in Raykov & Marcoulides, 2000:36), which states that the primary interest of research is to reject models, rather than confirming them, as there is no scientific way of proving the validity of a proposed model. Therefore, there is a preference for dealing with models with a large number of degrees of freedom. This is because with more degrees of freedom, the model has withstood a higher chance of being rejected when it is tested against the data. If the model was not rejected, the results are more trustworthy.
- CMIN/df: Kline (in Lee & Scott, 2004:251) proposes that CMIN/df ratio values of less than 3 are considered favourable for sample sizes of 200 and more, which was the case in this study.
- Root mean square error of approximation (RMSEA): The RMSEA takes model complexity into account, but has less rigid requirements for degree of fit. The primary principle of the RMSEA is that it evaluates the extent to which the model fails to fit the data. It is generally recommended that the RMSEA should be less than 0.05 for the fitted model to indicate a good approximation. Values between 0.05 and 0.08 indicate acceptable fit, values between 0.08 and 0.10 marginal fit, and values above 0.10 poor fit.
- Comparative fit index (CFI): The CFI compares a proposed model with the null model assuming no relationships between measures. CFI is defined as the ratio of improvement in non-centrality, moving from null to the proposed model, to the non-centrality of the null model. Therefore, a CFI that ranges between 0 and 1 is also recommended to be greater than 0.90 to indicate a good fit.
- Tucker-Lewis index (TLI): The TLI compares *T* (chi-square value) against a baseline model or the independence model, which assumes that all the covariances are zero. TLIs should ideally be greater than 0.9 for acceptable fit.
- Incremental fit index (IFI): The IFI also compares *T* (chi-square value) against a baseline model or the independence model, which assumes that all the covariances are zero. IFIs should ideally be greater than 0.9 for acceptable fit.

Both the CFA measurement models of the secondary school learner's avi-affinity (Section B1) and environmental and avi-values (Section D) did not show acceptable fit, and therefore an EFA was conducted to explore the underlying structure of the data. The following section outlines the EFA technique as applied to this study.

b. Exploratory factor analysis

EFA explores the data and provides the researcher with information on how many factors best represent the data; the factors are therefore derived from statistical results and not from theory (Hair *et al.*, 2014:603). A distinctive feature of EFA is that the factors are derived from statistical results, not from theory; they can therefore only be named after the factor analysis has been performed (Hair *et al.*, 2014:603). EFA can be conducted without knowing how many factors actually exist, or which variables belong with which factors (Hair *et al.*, 2014:603).

The EFA was used to determine the underlying structure of the data and to provide insight into the interrelationships among the variables in sections B1, D, E1 and E2 of the questionnaire (see Appendix A). The purpose of the EFA was to identify the underlying constructs/factors[46] in the data, as the variables may be indicators of the same theoretical construct (Aaker *et al*., 2011:490; Hair *et al*., 2014:92).

The procedure that was followed in performing the EFA in the present study is illustrated in Figure 4.7.

[46] Factor refers to a linear combination (variate) of the original variables. Factors also represent the underlying dimensions (constructs) that summarise or account for the original set of observed variables (Hair, Black & Babin, 2010:92).

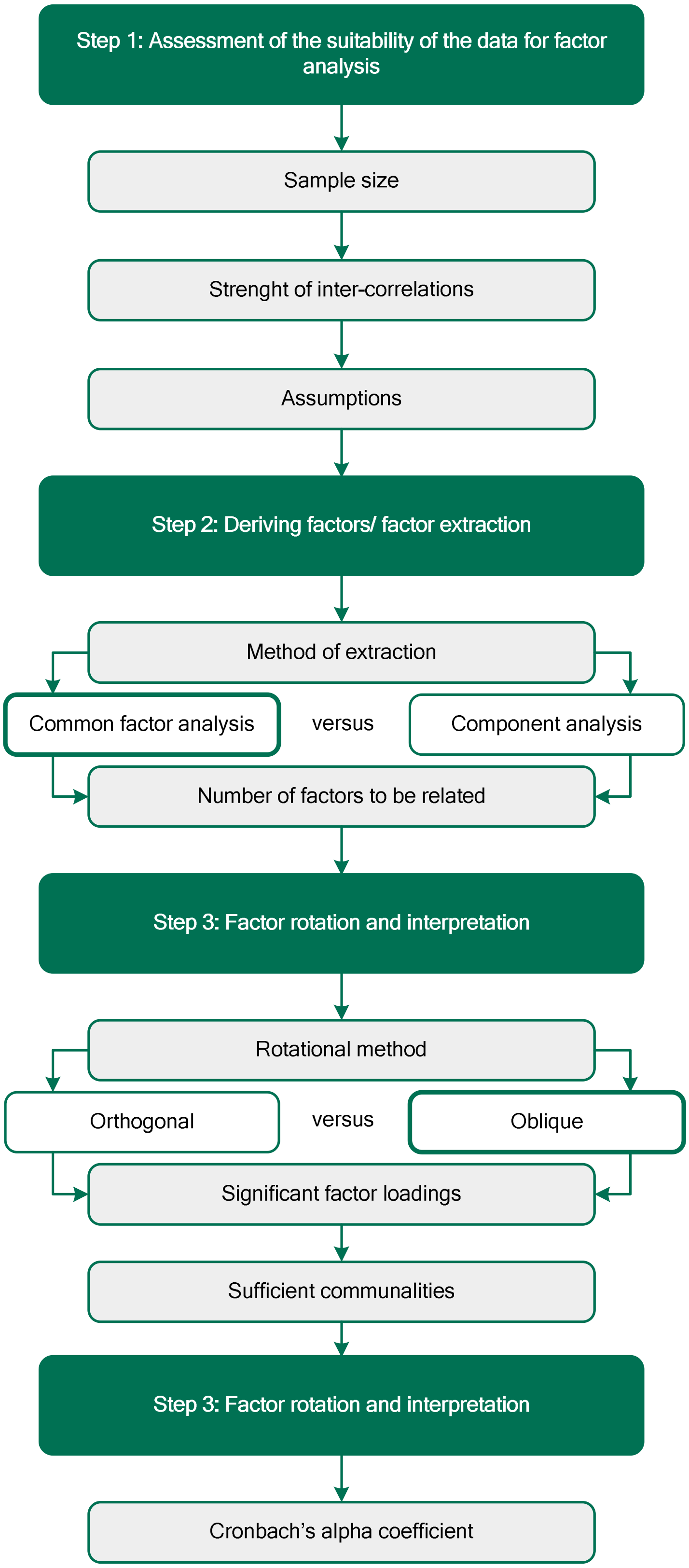

Figure 4.7: The process of EFA

Source: Adapted from Field (2013:657) and Hair *et al*. (2014:106)

Figure 4.7 illustrates the four steps involved in the EFA decision-making process. These steps are discussed in the paragraphs that follow.

Step 1: Assess the suitability of the data for factor analysis: Two main issues were considered in determining whether this particular data set was suitable for factor analysis, namely the 1) sample size and 2) strength of the relationship among the variables (or items). Firstly, the sample size of the current study (n = 5 488) was considered suitable for factor analysis (section 4.3.4). The second issue concerns the strength of the inter-correlations among the items. The relationships among the variables, measured with a Likert-type scale in sections B1, D, E1 and E2 of the questionnaire, were investigated using the Pearson product-moment correlation coefficient. An inspection of the correlation matrix revealed, as recommended, the presence of many coefficients of 0.3 and above, making them sufficient correlations to justify the application of factor analysis (Hair *et al.*, 2014:101; Tabachnick & Fidell, 2007:613).

In addition, two statistical measures, the Kaiser–Meyer–Olkin (KMO) measure of sampling adequacy and the Bartlett's test of sphericity, were used to aid in diagnosing the factorability of the correlation matrix (Bartlett, 1954; Kaiser, 1970; 1974). These measures indicate the suitability of the data for factor analysis, as well as the overall significance of all correlations within each of the identified dimensions (Pallant, 2011:182). The KMO index ranges from 0 to 1, with 0.6 suggested as the minimum value for a good factor analysis, while the Bartlett's test of sphericity should be significant ($p < 0.05$) indicating that sufficient correlations exist among the variables to proceed with factor analysis (Field, 2013:647; Hair *et al.*, 2014:105; Pallant, 2011:182). For the current study, these measures indicated that the data were suitable for factor analysis.

Step 2: Extract factors: Factor extraction involves determining the smallest number of factors that can be used to best represent the interrelationships among the set of variables (Pallant, 2011:183). In this stage, two decisions were made concerning the 1) method of extracting factors (common factor analysis versus component analysis) and 2) number of factors selected to represent the underlying structure in the data (Hair *et al.*, 2014:103). Patterns of correlation among the variables were examined by subjecting the set of items to common factor analyses, more specifically, principal axis factoring (PAF), using SPSS version 23.0. Because this study attempted to uncover underlying dimensions surrounding the original variables, common factor analysis was chosen (cf. Aaker *et al*., 2011:490; Malhotra, 2015:616). Common factor analysis is more appropriate when the primary objective is to identify the latent dimensions of constructs represented in the original variables and the researcher has limited knowledge about the amount of specific and error variance and therefore wishes to eliminate this variance (Hair *et al*., 2014:105). Although both methods attempt to produce a smaller number of linear combinations of the original variables in a way that accounts for most of the variability in the pattern of correlations (Pallant, 2011:181), common factor analysis partitions the shared variance from the unique variance and error variance, while component analysis does not discriminate between shared and unique variance (Pallant, 2011:182).

The decision on determining the number of factors to be retained was based on the consideration of the latent root (eigenvalue), percentage of variance and the scree test criteria (cf. Hair *et al*., 2014:107–108). According to these criteria, factors with eigenvalues greater than 1.0, enough factors to meet the specified percentage of variance explained, usually 60% or higher, and factors shown by the scree test to have substantial amounts of common variance (factors before inflection point), were retained (cf. Pallant, 2011:184). Once the number of factors had been determined, the next step was to interpret the factors.

Step 3: Perform factor rotation and interpretation: Factor rotation is "the process of manipulation or adjusting the factor axes to achieve a simpler and pragmatically meaningful factor solution" (Hair *et al*., 2014:90). It therefore presents the pattern of loadings in a manner that is easier to interpret (Pallant, 2011:184). There are two main approaches to rotation, resulting in either orthogonal (uncorrelated) or oblique (correlated) factor solutions (Hair *et al*., 2014:111; Pallant, 2011:185). To aid in the interpretation and scientific utility of the factors, the oblique rotational method, promax with Kaiser normalisation rotation, was performed. Rather than constraining the factor rotation to an orthogonal solution (the axes are maintained at 90 degrees), the oblique rotation method was used, as it is flexible and consequently identifies the extent to which each of the factors is correlated (Hair *et al*., 2010:93; Malhotra, 2015:619). Furthermore, considering the large sample size of the current study, promax with

Kaiser normalisation rotation was chosen, as this method is a faster procedure designed for large data sets (Field, 2013:644).

The interpretation of factors is based on factor loadings, which are “the correlations between the factors and the original variables” (Aaker *et al*., 2011:497). The factor loadings therefore provide an indication of which original variables are correlated with each factor, and the extent of each correlation (Aaker *et al*., 2011:497; Field, 2013:631). Because an oblique rotation method was used in this study, the factor pattern matrix, containing the factor loadings that represent the unique contribution of each variable to the factor, is reported (cf. Hair *et al.*, 2014:117). Guidelines for the identification of the significant factor loadings, as recommended by Hair *et al.* (2014:115), were based on the sample size. As n > 350, factor loadings of 0.30 and greater were considered significant and used for the interpretation (cf. Hair *et al.*, 2014:115).

Once the significant loadings had been identified, the researcher examined each variable’s communality[47] to identify whether there were variables that were not adequately accounted for by the factor solution (cf. Hair *et al.*, 2014:117). Communality is a measure of the proportion of variance explained by the extracted factors (Field, 2013:637). A relatively high communality therefore indicates that a variable has much in common with the other variables taken as a group (Zikmund & Babin, 2010:627). According to Field (2013:637), it is fundamental to know how much of the variance present in the data is common variance, as the purpose of a factor analysis is finding common underlying dimensions within the data (Field, 2013:637). For this study, one of the guidelines used for considering the inclusion of items in a factor solution was whether they share at least 10% (communality of 0.31) of their variance with the other items under consideration.

The subscales for the extracted factors were obtained by calculating the mean of the items loading on each of the subscales or factors. This resulted in factors being

[47] Communality or shared variance is “the percentage of a variable’s variance that contributes to the correlation with other variables or is ‘common’ to other variables” (Aaker *et al*., 2011:497). As such, a variable that has no specific variance (or random variance) would have a communality of 1; a variable that shares none of its variance with any other variable would have a communality of 0 (Field, 2013:637).

calculated and named. The last step in the EFA process was to assess the reliability of the factors.

Step 4: Assess the reliability of the factors: Reliability is an assessment of the degree of consistency between multiple measurements of a variable (Hair *et al.*, 2014:123). Cronbach's alpha coefficients were used to determine the internal consistency of each extracted factor. The generally agreed-upon lower limit for the Cronbach's alpha is 0.70, although it may decrease to 0.60 in exploratory research (Hair *et al*., 2014:123). Lastly, descriptive statistics were calculated for the interpretation of the factors. The researcher could then use the reliable factors in the subsequent analysis, namely SEM, which is discussed in the next section.

The results of the EFA are provided in Chapter 5 (section 5.4).

c. Structural equation modelling (SEM)

SEM can be defined as a procedure for estimating a series of multiple, interrelated dependence relationships between a set of concepts or constructs represented by multiple measured variables (latent constructs) and incorporated into an integrated model (Hair *et al*., 2014:546; Malhotra, Baalbaki & Bechwati, 2013:710; Raykov & Marcoulides, 2000:1). From the above-mentioned definition, it is evident that SEM models are distinguished by the following characteristics:

- Estimation of multiple and interrelated dependence relationships: SEM, in its simplest sense, provides the appropriate and most efficient estimation technique for a series of multiple regression equations estimated simultaneously (Hair *et al*., 2014:19). First, the researcher draws upon theory, prior experience and the research objectives to distinguish which independent variables predict each dependent variable (Hair *et al*., 2014:547). The proposed relationships are then translated into a series of structural equations for each dependent variable. This feature sets SEM apart from other techniques, such as multivariate analysis of variance and canonical correlation, in that they only allow a single relationship between dependent and independent variables (Hair *et al*., 2014:547).
- Incorporating latent variables not measured directly: SEM has the ability to 1) incorporate unobserved or latent constructs in these relationships and 2) account for measurement error in the estimation process. Latent constructs are measured

indirectly by examining consistency among multiple measured variables (manifest variables or indicators) that were gathered through various data-collection methods (i.e. surveys in the current study). The intent is for the collective set of questions to represent the concept better than any single item (Hair *et al*., 2014:547). Therefore, latent constructs firstly better represent theoretical concepts by using multiple measures of a concept to reduce measurement error. Secondly, they improve the statistical estimation of the relationships between the concepts by accounting for the measurement error in the concepts (Hair *et al*., 2014:547). Furthermore, it is important to distinguish between exogenous and endogenous latent constructs. Exogenous constructs are the latent, multi-item variables that act as independent variables in the model (Hair *et al*., 2014:549). Exogenous constructs are the latent multi-item constructs that are theoretically determined by factors within the model, and therefore are dependent on other constructs. The dependence of endogenous constructs is visually represented by a path (one-headed arrows) from one construct to another, while exogenous constructs, given that they are independent, do not have any paths from other constructs or variables (Hair *et al*., 2014:549).

- Defining a model: A model can be described as a representation of theory, which is "a systematic set of relationships providing a consistent and comprehensive explanation of phenomena" (Hair *et al*., 2014:549). The SEM model should be dictated by a strong theoretical base (Hair *et al*., 2014:550). Researchers portray a model in a visual form, known as a path diagram. The visual portrayal of a complete SEM model, consisting of measurement and structural models, indicates the relationships that employ specific conventions for both the constructs (indicated by circles or ovals) and the measured variables (indicated by squares or rectangles), as well as the relationships between them (Hair *et al*., 2014:550); for example, a measurement relationship, depicted by a straight arrow, between the latent construct and the measured variables, or a structural relationship between latent constructs, which can be either a dependence relationship (single-headed directional arrows) or a correlational relationship (two-headed arrows) (Hair *et al*., 2014:550). Lastly, the researcher needs to accept or reject the entire model, determining whether the overall model fit is acceptable (Hair *et al*., 2014:552).

Hence, if a researcher can express a theory in terms of relationships among measured variables and latent constructs, SEM will assess how well the theory fits reality as represented by the data of the study (Hair *et al.*, 2014:565). The procedure that was followed in performing SEM in this study is illustrated in Figure 4.8.

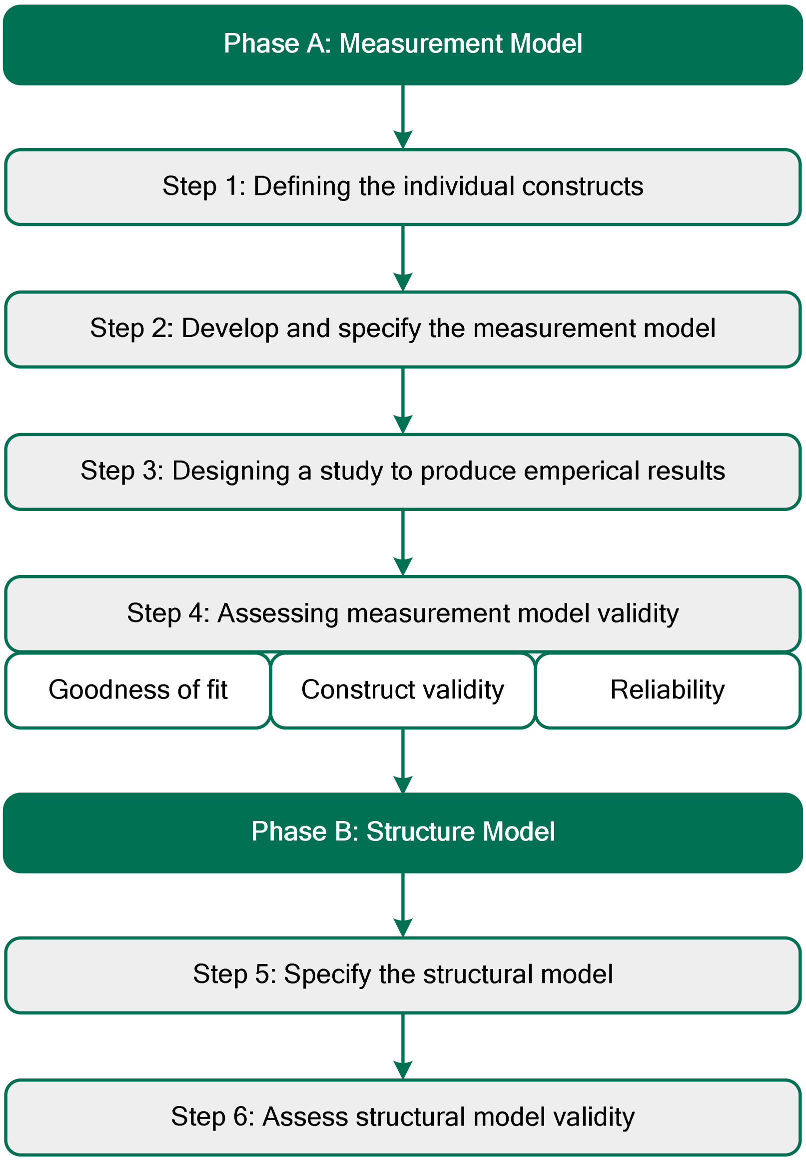

Figure 4.8: The process of SEM

Source: Adapted from Hair *et al*. (2014:566)

The six-step decision process reflecting the procedures of SEM is illustrated in Figure 4.8. SEM is represented by two components: 1) the measurement model and 2) the structural model. The measurement model procedure is outlined in steps 1 to 4, while the structural model procedure is discussed in steps 5 to 6. The remainder of this section provides an overview of the six steps as applied in this study.

Phase A: Measurement model: A measurement model is defined as an "SEM model that 1) specifies the indicators for each construct and 2) enables an assessment of construct validity" (Hair *et al*., 2014:544). In this study, the researcher was interested in developing and testing a measurement model made up of constructs that affect secondary school learners' behaviour towards birds and the natural environment in which birds live. The measurement model for the current study was operationalised following the first four steps of the process of SEM.

Step 1: Define the individual constructs: The manner in which the researcher selects the items to measure each construct sets the foundation for the entire remainder of the SEM analysis (Hair *et al*., 2014:567). In this step, the researcher selected five specific constructs, based on published literature, that represent the conceptual literacy framework for sustainable avitourism to be tested and included in the analysis (see Figure 3.1). This process began with defining each construct theoretically (see Chapters 2 and 3). The constructs were then operationalised by selecting their measurement scale items and the scale type (section 4.4) (cf. Hair *et al*., 2014:567).

As all constructs should display adequate construct validity, the scales were developed from previous research and previously established scales in the environmental psychology and/or environmental education domains and were adapted for the current study, which focused specifically on birds and the natural environment in which birds live. These scales were checked for content validity, as the scales were subjected to experts' opinion. In addition, the measures were pre-tested to purify measures (Hair *et al*., 2014:567). Scale purification was based on item-total correlations and EFA results from the pre-test involving 367 secondary school learners, which resulted in the final questionnaire (see Appendix A).

In addition, the constructs (B1, D, E1 and E2) were subjected to EFA, as discussed in section 4.9.1 (b). The purpose of the EFA was to identify the underlying constructs/factors in the data, as the variables may be indicators of the same theoretical construct (Aaker *et al*., 2011:490; Hair *et al*., 2010:96). The factors/constructs that derived from the EFA were then used in SEM. From the EFA results of Section B1 in the questionnaire, two factors were identified to explain the environmental and avi-orientation of learners towards birds and bird habitat (avi-orientation). These two factors were labelled as (1) avi-affinity and (2) avi-awareness. In addition, the EFA results applied to environmental and avi-values (Section D in the questionnaire) identified four factors to explain the values of learners regarding birds and bird habitat. These four factors were labelled as (1) pro-environmental values, (2) utilisation, (3) enjoyment and (4) critical resources. Applying EFA to behavioural intention (Section E1 in the questionnaire), two factors were identified and labelled as (1) intended pro-environmental and avi-behaviour and (2) intended birdwatching behaviour. Lastly, applying EFA to the actual behaviour construct (Section E2 in the questionnaire), two factors were identified, namely (1) pro-environmental and avi-behaviour and (2) birdwatching behaviour. Once the constructs were defined and operationalised, the measurement model was developed and specified, as discussed in Step 2.

Step 2: Develop and specify the measurement model: In this step, each latent construct to be included in the model was identified and the measured indicator variables (items) were assigned to the latent constructs (cf. Hair *et al*., 2014:567). The identification and assignment are presented by means of a diagram (cf. Hair *et al*., 2014:568). Specification of the complete measurement model uses measurement relationships for the items and constructs, correlational relationships among the constructs, and error terms for the items (Hair *et al*., 2010:568). The visual diagrams depicting the measurement models of the current study are illustrated in the results section (see Chapter 6). Furthermore, two key issues were considered in this step, namely 1) unidimensionality and 2) model identification relating to the number of items per construct.

Unidimensional measures mean that each measured variable is hypothesised to relate to only a single construct (Hair *et al*., 2014:606), which was the case in this study. Model identification,[48] the second key issue, deals with whether enough information exists to identify a solution to the set of structural equations (Hair *et al*., 2014:608).

[48] Identification relates to "whether enough information exists to identify a solution for a set of structural equations. An identification problem leads to an inability of the proposed model to generate unique estimates and can prevent the SEM programme from producing results. The three possible conditions of identification are overidentified, just-identified and underidentified" (Hair *et al*., 2014:608).

According to Hair *et al*. (2014:611), the number of latent constructs should be indicated by at least three measured variables (preferably four), as for any given measurement model, a solution can be found with positive degrees of freedom and a corresponding chi-square goodness-of-fit value.

In a CFA or an SEM model, one parameter can be estimated for each unique variance and covariance in the observed covariance matrix. Therefore, the covariance matrix provides the degrees of freedom used to estimate parameters (Hair *et al*., 2014:609). Models and the constructs can be characterised by the degree of identification, which is defined by the degrees of freedom of a model after all the parameters to be estimated are specified (Hair *et al*., 2014:609). Consequently, overidentified models, which have more unique covariance and variance terms than parameters to be estimated, are preferred (Hair *et al*., 2014:609). In this study, the majority of latent constructs were indicated by more than four indicators and were therefore overidentified, except for avi-awareness, where only two indicators were assigned to the construct. However, even though a unidimensional two-item construct CFA is underidentified on its own, if it is integrated into a CFA model with other constructs, the overall model may be overidentified (Hair *et al*., 2014:610).

Step 3: Design a study to produce empirical results: This stage involves designing a study that will produce confirmatory results (Hair *et al*., 2014:612). Three issues were considered in this stage, namely (1) the sample size, (2) the approach took regarding missing data and (3) model estimation. Even though a sample size of n = 5 488 was obtained for the current study, model complexity and communalities were also investigated. It was concluded that the sample size was appropriate to conduct an SEM (section 4.3.4).

For the current study, missing values constituted approximately between 5 and 10% of all the observations for each variable. Various methods exist to solve the missing data problem, including the complete case approach (list-wise deletion), the all-available approach (pair-wise deletion), imputation techniques (e.g. mean substitution) and model-based approaches (Hair *et al*., 2014:571). In this case, mean substitution was used, as the missing values were replaced by the mean of the variable of interest.

An SEM-specific research design consideration includes model estimation. Once the model is specified (Step 2), the model estimation techniques are considered. This study applied the maximum likelihood estimation (MLE) technique, which is a procedure that iteratively improves parameter estimates to maximise a specified fit function (Hair *et al*., 2014:575). Despite the potential sensitivity of MLE to non-normality, this estimation method is most commonly employed in SEM and is the default in most SEM programmes (Hair *et al*., 2014:575). The current study applied the statistical programme AMOS version 23, as in addition to being a module of SPSS, it was also among the first SEM programmes to use a graphical interface for all functions (Hair *et al*., 2014:575).

Once the measurement model is specified (Step 2), an SEM model is estimated to provide an empirical measure among the relationships, variables and constructs, represented by the measurement theory (Step 3). In Step 4, the most fundamental question in SEM testing of "Is the measurement model valid?" is answered.

Step 4: Assess measurement model validity: The validity of the measurement model depends on (1) acceptable levels of goodness of fit and (2) construct validity (Hair *et al*., 2014:576). Construct validity is examined first through various empirical measures of goodness of fit (Hair *et al*., 2014:617). Goodness of fit indicates the similarity of the observed and estimated co-variance matrices (Hair *et al*., 2014:577). In SEM, the theory is represented by the measurement model, while the sample data are represented by a covariance matrix of measured items. In the SEM results, the equations enable the researcher to compare the theory against reality as represented by the sample data, thereby indicating how well the theory fits the data (Hair *et al*., 2014:617). Hence, the results of the CFA are used to test or confirm whether the theoretical measurement model is valid. For the goodness-of-fit indices used in the current study (section 4.9.1 (a) CFA).

Many researchers conduct an EFA before trying to confirm the model (Hair *et al*., 2014:617). For the current study, a CFA was applied first to test whether the categories found in exploratory research on general environmental orientations in Section B1 (Larson *et al*., 2011:79) and environmental values in Section D (Bogner & Wiseman, 2006:253) could be confirmed in this study. However, the CFA models did not show acceptable fit, as the current study was not based on the general environment, but was adapted to focus specifically on birds and the environment in which birds live. Consequently, an explorative approach (EFA) was also applied to the data of the current study, as it is an appropriate tool for identifying factors among multiple variables (Hair *et al*., 2014:617). As such, EFA results can be useful in developing theory that will lead to a proposed measurement model, while the CFA is used to confirm the measurement model developed using EFA (Hair *et al*., 2014:617).

Furthermore, one of the most fundamental assessments of construct validity involves the path estimates (measurement relationships) between constructs and indicator variables (Hair *et al*., 2014:617). Once the CFA is applied, a good conceptual understanding of the constructs and their items should exist; therefore, when testing the measurement model, relatively high loadings are expected (Hair *et al*., 2014:617). Rules of thumb suggest that the loadings (standardised loading estimates) should be at least 0.5 and ideally 0.7 or higher. Loadings of this size confirm that the indicators are strongly related to their associated constructs and are therefore also an indicator of construct validity (Hair *et al*., 2014:618). In addition, the statistical significance of each estimated coefficient was assessed. Loading estimates should be statistical significant; however, if the loading estimate is low (< 0.5), it does not qualify as a good item (Hair *et al*., 2014:622). SEM models also display the squared multiple correlations (also referred to as item reliability, communality or variance extracted) for each variable, representing the extent to which a measured variable's variance is explained by a latent factor, therefore how well the item measures the construct (Hair *et al*., 2014:618).

One of the primary objectives of CFA/SEM is to determine the construct validity of the proposed measurement theory. Construct validity refers to "the extent to which a set of measured items actually reflects the theoretical latent construct those items are designed to measure" (Hair *et al*., 2014:618).

Furthermore, CFA provides additional diagnostic information that may suggest modifying the measurement model to improve the model's test of measurement theory (Hair *et al*., 2014:621). A modification index is calculated for every possible relationship that is not estimated in the model. Modification indices most useful in a CFA are for the factor loadings and the error terms between items (Hair *et al*., 2014:618). Modification indices of approximately 4.0 or greater suggest that the fit could be improved. The researcher should use the modification indices only as a guideline for model improvements of those relationships that can be justified theoretically (Hair *et al*., 2014:621). For the current study, modification indices were studied and where theoretically justified, and additional covariances between measurement errors were included.

To summarise the outcome of the CFA that was applied to the measurement models, in general, the CFA results support the measurement models of the current study. The chi-square statistic was significant above the 0.01 level, which is not unusual given the total sample size of n = 5 488. Overall, the fit statistics suggested that the estimated model reproduced the sample covariance matrix well. Based on the results of the CFA, the researcher continued with the second phase, the structural model.

Phase B: Structural model: In Phase B, the measurement scales are then integrated into the estimation of the relationships between dependent and independent variables in the structural model. The structural model is the path model that relates independent to dependent variables (Hair *et al*., 2010:19). Theory, prior experience or other guidelines enable the researcher to distinguish which independent variables predict each dependent variable (Hair *et al*., 2010:19). The structural model for the current study was operationalised following the last two steps (steps 5 and 6) of the process of SEM.

Step 5: Specify the structural model: When a structural model is specified, it should use the CFA factor pattern corresponding to the measurement theory and allow the coefficients for the loadings and the error variance terms to be estimated along with the structural model coefficients (Hair *et al*., 2014:650). With the construct measures in place, the structural relationships between the constructs are now established. In Step 5, the structural theory defined and path diagram displaying the structural relationships are expressed visually (see Figure 6.1 for the initial structural model of the present study). To gain more insight into the relationships within the model, it was decided to make use of a stepwise process to test the relationships within and across each of the building blocks of the model (see Figure 6.2).

The research hypotheses set for SEM Building block 1 (section 6.2) are indicated in Table 4.12. The research hypotheses that were set for Building block 2 (section 6.3) are presented in Table 4.13, while the research hypotheses for the final model (section 6.6) are outlined in Table 4.14.

Table 4.12: Summary of the research hypotheses: SEM Building block 1

Null hypotheses		**Alternative research hypotheses**	
Hypotheses regarding the relationships between avi-affinity and bird and environmental knowledge			
H_{01}:	Avi-affinity is not related to bird and environmental knowledge.	H_1:	Avi-affinity is related to bird and environmental knowledge.
Hypotheses regarding the relationships between avi-awareness and bird and environmental knowledge			
H_{02}:	Avi-awareness is not related to bird and environmental knowledge.	H_2:	Avi-awareness is related to bird and environmental knowledge.

Table 4.13: Summary of the research hypotheses: Building block 2 (SEM model 3)

Null hypotheses		**Alternative research hypotheses**	
Hypotheses regarding the relationships between avi-affinity and environmental and avi-values			
H_{03}:	Avi-affinity is not related to critical resources.	H_3:	Avi-affinity is related to critical resources.
H_{04}:	Avi-affinity is not related to enjoyment.	H_4:	Avi-affinity is related to enjoyment.
H_{05}:	Avi-affinity is not related to pro-environmental values.	H_5:	Avi-affinity is related to pro-environmental values.
H_{06}:	Avi-affinity is not related to utilisation.	H_6:	Avi-affinity is related to utilisation.
Hypotheses regarding the relationships between avi-awareness and environmental and avi-values			
H_{07}:	Avi-awareness is not related to critical resources.	H_7:	Avi-awareness is related to critical resources.
H_{08}:	Avi-awareness is not related to enjoyment.	H_8:	Avi-awareness is related to enjoyment.
H_{09}:	Avi-awareness is not related to pro-environmental values.	H_9:	Avi-awareness is related to pro-environmental values.
H_{010}:	Avi-awareness is not related to utilisation.	H_{10}:	Avi-awareness is related to utilisation.
Hypotheses regarding the relationships between knowledge and environmental and avi-values			
H_{011}:	Knowledge is not related to critical resources.	H_{11}:	Knowledge is related to critical resources.
H_{012}:	Knowledge is not related to enjoyment.	H_{12}:	Knowledge is related to enjoyment.
H_{013}:	Knowledge is not related to pro-environmental values.	H_{13}:	Knowledge is related to pro-environmental values.
H_{014}:	Knowledge is not related to utilisation.	H_{011}:	Knowledge is related to critical resources.
Hypotheses regarding the moderating effect of knowledge between avi-affinity and environmental and avi-values			

H_{015}:	Knowledge does not moderate the relationship between avi-affinity and critical resources.	H_{15}:	Knowledge does moderate the relationship between avi-affinity and critical resources.
H_{016}:	Knowledge does not moderate the relationship between avi-affinity and enjoyment.	H_{16}:	Knowledge does moderate the relationship between avi-affinity and enjoyment.
H_{017}:	Knowledge does not moderate the relationship between avi-affinity and pro-environmental values.	H_{17}:	Knowledge does moderate the relationship between avi-affinity and pro-environmental values.
H_{018}:	Knowledge does not moderate the relationship between avi-affinity and utilisation.	H_{18}:	Knowledge does moderate the relationship between avi-affinity and utilisation.
Hypotheses regarding the moderating effect of knowledge between avi-awareness and environmental and avi-values			
H_{019}:	Knowledge does not moderate the relationship between avi-awareness and critical resources.	H_{19}:	Knowledge does moderate the relationship between avi-awareness and critical resources.
H_{020}:	Knowledge does not moderate the relationship between avi-awareness and enjoyment.	H_{20}:	Knowledge does moderate the relationship between avi-awareness and enjoyment.
H_{021}:	Knowledge does not moderate the relationship between avi-awareness and pro-environmental values.	H_{21}:	Knowledge does moderate the relationship between avi-awareness and pro-environmental values.
H_{022}:	Knowledge does not moderate the relationship between avi-awareness and utilisation.	H_{22}:	Knowledge does moderate the relationship between avi-awareness and utilisation.

Table 4.14: Summary of the research hypotheses: Final SEM model

Null hypotheses		Alternative research hypotheses	
Hypotheses regarding the relationships between avi-orientation and environmental and avi-values			
$H_{03,07}$:	Avi-orientation is not related to critical resources.	$H_{3,7}$:	Avi-orientation is related to critical resources.
$H_{04,08}$:	Avi-orientation is not related to enjoyment.	$H_{4,8}$:	Avi-orientation is related to enjoyment.
$H_{05,09}$:	Avi-orientation is not related to pro-environmental values.	$H_{5.9}$:	Avi-orientation is related to pro-environmental values.
$H_{06,010}$:	Avi-orientation is not related to utilisation.	$H_{6,10}$:	Avi-orientation is related to utilisation.
Hypotheses regarding the relationships between knowledge and environmental and avi-values			
H_{011}:	Knowledge is not related to critical resources.	H_{11}:	Knowledge is related to critical resources.
H_{012}:	Knowledge is not related to enjoyment.	H_{12}:	Knowledge is related to enjoyment.
H_{013}:	Knowledge is not related to pro-environmental values.	H_{13}:	Knowledge is related to pro-environmental values.
H_{014}:	Knowledge is not related to utilisation.	H_{014}:	Knowledge is related to utilisation.

Null hypotheses		Alternative research hypotheses	
Hypotheses regarding the interaction effect between knowledge and avi-affinity with environmental and avi-values			
H_{015}:	The interaction effect between knowledge and avi-affinity does not have an effect on critical resources.	H_{15}:	The interaction effect between knowledge and avi-affinity has an effect on critical resources.
H_{016}:	The interaction effect between knowledge and avi-affinity does not have an effect on enjoyment.	H_{16}:	The interaction effect between knowledge and avi-affinity has an effect on enjoyment.
H_{017}:	The interaction effect between knowledge and avi-affinity does not have an effect on pro-environmental values.	H_{17}:	The interaction effect between knowledge and avi-affinity has an effect on pro-environmental values.
H_{018}:	The interaction effect between knowledge and avi-affinity does not have an effect on utilisation.	H_{18}:	The interaction effect between knowledge and avi-affinity has an effect on utilisation.
Hypotheses regarding the interaction effect between knowledge and avi-awareness with environmental and avi-values			
H_{019}:	The interaction effect between knowledge and avi-awareness does not have an effect on critical resources.	H_{19}:	The interaction effect between knowledge and avi-awareness has an effect on critical resources.
H_{020}:	The interaction effect between knowledge and avi-awareness does not have an effect on enjoyment.	H_{20}:	The interaction effect between knowledge and avi-awareness has an effect on critical resources.
H_{021}:	The interaction effect between knowledge and avi-awareness does not have an effect on pro-environmental values.	H_{21}:	The interaction effect between knowledge and avi-awareness has an effect on critical resources.
H_{022}:	The interaction effect between knowledge and avi-awareness does not have an effect on utilisation.	H_{22}:	The interaction effect between knowledge and avi-awareness has an effect on critical resources.
Hypotheses regarding the relationships between environmental and avi-values and intended pro-environmental and avi-behaviour			
H_{023}:	Critical resources are not related to intended pro-environmental and avi-behaviour.	H_{23}:	Critical resources are related to intended pro-environmental and avi-behaviour.
H_{024}:	Enjoyment is not related to intended pro-environmental and avi-behaviour.	H_{24}:	Enjoyment is related to intended pro-environmental and avi-behaviour.
H_{025}:	Pro-environmental values are not related to intended pro-environmental and avi-behaviour.	H_{25}:	Pro-environmental values are related to intended pro-environmental and avi-behaviour.
H_{026}:	Utilisation is not related to intended pro-environmental and avi-behaviour.	H_{26}:	Utilisation is related to intended pro-environmental and avi-behaviour.
Hypotheses regarding the relationships between environmental and avi-values and intended birdwatching behaviour			
H_{027}:	Critical resources are not related to intended birdwatching behaviour.	H_{27}:	Critical resources are related to intended birdwatching behaviour.

Null hypotheses		Alternative research hypotheses	
H_{028}:	Enjoyment is not related to intended birdwatching behaviour.	H_{28}:	Enjoyment is related to intended birdwatching behaviour.
H_{029}:	Pro-environmental values are not related to intended birdwatching behaviour.	H_{29}:	Pro-environmental values are related to intended birdwatching behaviour.
H_{030}:	Utilisation is not related to intended birdwatching behaviour.	H_{30}:	Utilisation is related to intended birdwatching behaviour.
Hypotheses regarding the relationships between intended pro-environmental and avi-behaviour (BehInt1) on actual pro-environmental and avi-behaviour (Actual behaviour1) and actual birdwatching behaviour (Actual behaviour2)			
H_{031}:	Intended pro-environmental and avi-behaviour is not related to actual pro-environmental and avi-behaviour.	H_{31}:	Intended pro-environmental and avi-behaviour is related to actual pro-environmental and avi-behaviour.
H_{032}:	Intended pro-environmental and avi-behaviour is not related to actual birdwatching behaviour.	H_{32}:	Intended pro-environmental and avi-behaviour is related to actual birdwatching behaviour.
Hypotheses regarding the relationships between intended birdwatching behaviour (BehInt2) on actual pro-environmental and avi-behaviour (Actual behaviour1) and actual birdwatching behaviour (Actual behaviour2)			
H_{033}:	Intended birdwatching behaviour is not related to actual pro-environmental and avi-behaviour.	H_{33}:	Intended birdwatching behaviour is related to actual pro-environmental and avi-behaviour.
H_{034}:	Intended birdwatching behaviour is not related to actual birdwatching behaviour.	H_{34}:	Intended birdwatching behaviour is related to actual birdwatching behaviour.

The structural models, presented in Chapter 6 of the present study, were estimated and assessed, as explained in Step 6.

Step 6: Assess structural model validity: The emphasis in Step 6 was firstly on SEM model fit and secondly on whether the structural relationships are consistent with theoretical expectations, as recommended by Hair *et al*. (2014:655). Goodness-of-fit indices used in the current study were explained in the previous section (see section 4.8.4 a). The fit statistics of the current study provided an overall good fit. However, validation of the model is not complete without examining the individual parameter estimates (Hair *et al*., 2014:656), and therefore the path coefficients and loading estimates were examined. Based on the results of the SEM, the hypotheses (see Tables 4.11–4.13) that were set for building blocks 1, 2 and 3 were evaluated and are presented in Chapter 6 (see sections 6.2.3, 6.3.4 and 6.6).

In Building block 2, the potential role of knowledge as a moderator in the relationship between environmental and avi-orientation and environmental and avi-values was considered (section 6.3.3). Testing for moderation is now discussed.

d. Testing for moderation

Correlational and dependence relationships are the 'building blocks' of structural models in SEM (Hair *et al*., 2010:766). Moderation can be described as a variation of these relationships, or a new relationship type (Hair *et al*., 2010:766). The discussion of moderation in the context of the current study firstly focuses on the theoretical nature of the relationship and secondly on how this moderating relationship was incorporated into the SEM model (see Building block 2, model 3 in section 6.3.3).

The moderating effect refers to "the effect of a third variable or construct changing the relationship between two related variables or constructs" (Hair *et al*., 2010:690); that is, the relationship between two variables changes based on the level or amount of a moderator (Hair *et al*., 2010:690). The moderating variable therefore affects the relationship between the independent and the dependent variable and has the potential to alter the strength of this relationship (Baron & Kenny, 1986:1174; Frazier, Tix & Barron, 2004; Jose, 2013:7). An investigation of the moderator effect allowed the researcher to give a more precise description of the relationship between independent and outcome variables (Ro, 2012:952), as the main effects alone may not offer sufficient precision in prediction (Aguinis, 2004). When a researcher overlooks the possibility of a moderator in the model when it is needed, a more exact explanation will be missed (Ro, 2012:952). The association of the independent variable with the outcome variable is stronger or weaker at different levels of the moderator variable (Ro, 2012:952). A researcher who includes a moderator in the model is usually more interested in the independent variable than the moderator, but wants to know 'when' the relationship occurs between the independent and the outcome variables (Baron & Kenny, 1986; Ro, 2012:953). Therefore, the decision about whether a variable is a moderator should be based on theory and the conceptual framework that guides the research (Ro, 2012:954).

In the current study it was considered whether the environmental and avi-knowledge variable could possibly be a moderator between two related constructs (environmental and avi-orientation and environmental and avi-values). Figure 4.9 provides the schematic diagram showing the independent and dependent variables and the moderator, as applied in the current study.

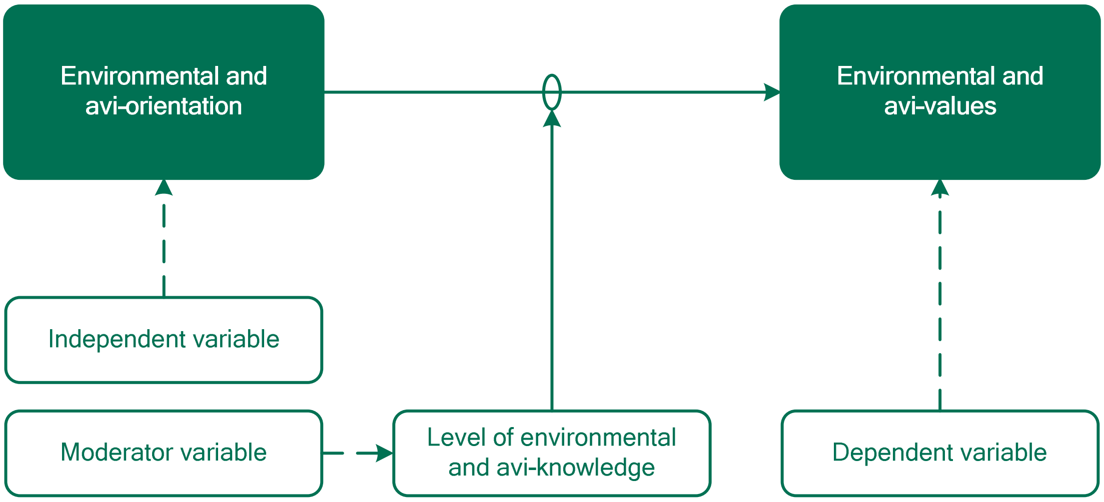

Figure 4.9: The independent and dependent variables and the moderator in the current study

Source: Adapted from Jose (2013:155)

Figure 4.9 illustrates the potential role of environmental and avi-knowledge as a moderator in the relationship between environmental and avi-orientation and environmental and avi-values. If a relationship between environmental and avi-orientation and environmental and avi-values changes significantly when measured for low knowledge levels versus high knowledge levels, the knowledge variable moderates the relationship.

For the purpose of this study, the SEM approach was used to test moderator effects, as the researcher was interested in the prospect of embedding a moderational analysis in a larger path model (cf. Jose, 2013:223). Although most previous statistical analysis discussions on testing for moderation illustrate the regression technique, the SEM technique has emerged as a popular new approach for testing research models including moderators (Ro, 2012:952). In addition, moderation can be tested with path analysis in SEM and will yield an identical result as the regression technique (Jose, 2013:223). Regression analyses tend to underestimate the interaction effect, particularly as the measurement error in the predictor and moderator increases (Jaccard & Wan, 1996). Therefore, when the researcher has more than one measured variable for each of the constructs, SEM is suggested, because measurement errors in the SEM model can be controlled, thereby minimising the underestimation problem (Jose, 2013:27). Figure 4.10 illustrates how the regression equation for moderation was modelled in the SEM.

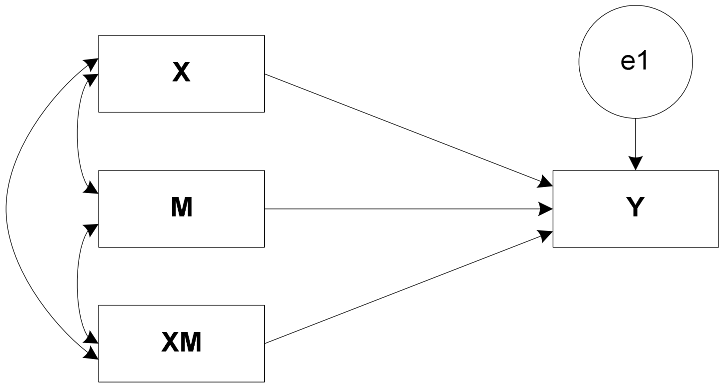

Figure 4.10: The regression equation for moderation in the SEM

Source: Adapted from Jose (2013:225)

Figure 4.10 illustrates whether knowledge (M) was postulated as a potential moderator in the relationship between avi-orientation (X) and avi-values (Y). The metric moderator (knowledge) was modelled by creating interaction terms, similar to when using a regression approach (Hair *et al.*, 2010:771). The interaction terms provide important information about how the independent variables (X) and the moderating variable (M) *jointly* predict the dependent variable (Y) (Jose, 2013:11). The interaction terms for the current study were calculated by multiplying the standardised knowledge values with the standardised avi-orientation (avi-affinity and avi-awareness) values (Hair *et al.*, 2010:771).

According to the statistical rules for moderation (Jose, 2013:11), the following statistical hypotheses were applied in this study:

1) Hypothesis 1: The X–Y relationship (testing for β_1)
2) Hypothesis 2: The M–Y relationship (testing for β_2)
3) Hypothesis 3: The XM–Y relationship (testing for β_3).

The regression coefficient β_1 measures the simple effects of X (independent variable) on Y (dependent variable) when the value of the moderating variable M = 0 (no interaction effects), while β_2 measures the effects of the moderating variable M on Y. The regression coefficient β_3 measures the interaction effect between the independent variable X and the moderating variable M. The test of moderation is operationalised by the product term XM (the multiplication between the two independent variables). In order to test the moderation in the model, one needs to test β_3 (the coefficient of interaction term XM). If β_3 is significant, then one could conclude that moderating variable M moderates the relationship between X and Y (Jose, 2013:11). The moderator hypothesis is supported if the interaction (XM–Y) is significant (Baron & Kenny, 1986:1174). In addition to these basic considerations, it is desirable that the moderator variable be uncorrelated with both the predictor and the criterion (the dependent variable) to provide a clearly interpretable interaction term (Baron & Kenny, 1986:1174). However, according to Jose (2013:26), the moderating variable should not be highly correlated with the dependent variable, but strict non-significant correlation is not necessary.

The moderation effects of the moderator variable M in the model occur if Hypothesis 3 (β_3) is statistically significant. Hypothesis 2 (β_2) is not statistically significant. As for Hypothesis 1 (β_1), there are two possibilities to occur:

1) If Hypothesis 1 is not statistically significant, 'complete moderation' occurs.
2) If Hypothesis 1 is statistical significant, 'partial moderation' occurs.

4.9 PRESENTATION OF RESEARCH FINDINGS

Having analysed the data, the final step is to present the findings effectively. The main purpose of using data-display techniques is to make the findings clear and easily understood (Kumar, 2011:248). The research findings are presented in chapters 5 and 6, while the conclusions and recommendations are provided in Chapter 7.

4.10 RESEARCH ETHICS

Ethical principles should be practised and internalised by researchers in order to make ethically guided decisions for the humane and sensitive treatment of participants (De Vos *et al*., 2012:115). The unique nature of school learners as research participants has led to special ethical issues raised in research with children (Greig, Taylor & MacKay, 1999:144).

Prior to the start of the study, official permission from the GDE was obtained to conduct the study amongst secondary school learners (see Appendix C). Following this sanction, the study was approved by the Research Ethics Committee (REC) of the Bureau of Market Research (BMR) at Unisa (see Appendix D). Finally, after obtaining the consent of school principals, school governing bodies and parents, the research project was finally sanctioned.

The ethical principles of voluntary and informed participation, confidentiality, anonymity and non-harm were considered in conducting the research (cf. De Vos *et al.*, 2012:58). The researcher ensured that the process of undertaking the research adhered to sound ethical principles.

4.11 CONCLUSION

This chapter discussed and justified the research design employed in this research. The methodological procedure of the present study consisted of three phases. The first two phases represented the secondary research (exploratory research). *Phase 1* involved a literature review (see Chapter 2), while in *phase 2*, a conceptual literacy framework for sustainable avitourism was developed (see Chapter 3). *Phase 3* represented the primary research (descriptive research) conducted for this study, in which the conceptual literacy framework for sustainable avitourism were tested empirically. This chapter (Chapter 4) elaborated on the eight steps in the primary research process as applied to this study.

A quantitative research design was used to test the conceptual literacy framework for sustainable avitourism, which was based on previous literature from the environmental education and literacy domains. A survey design (quantitative cross-sectional survey) was selected for the research (see section 4.2), and a self-administered questionnaire was developed as the research instrument (see section 4.4). The questionnaire was developed to measure the six identified components (constructs), namely environmental and avi-orientation, behavioural involvement, environmental and avi-knowledge, environmental and avi-values, pro-environmental behavioural intention and pro-environmental and avi-behaviour of learners towards birds, the natural environment and avitourism. The constructs and items were based on the conceptual literacy framework for sustainable avitourism that was established in the literature review (see Table 4.3).

A multi-stage sampling plan approach (see Figure 4.5) was used to obtain information on the target population, namely secondary school learners in Grades 8 to 10 who attended various secondary schools in Gauteng (South Africa) during July to October in 2014.

After a pilot test was conducted (see section 4.5), the data for the current study were collected at 17 purposively selected secondary schools in Gauteng. The data as used in this study were obtained from n = 5 488 secondary school learners (aged 13–17 years). This chapter further outlined the procedures followed in collecting data with consideration given to maximising reliability and validity (see section 4.6). Data were coded, captured and analysed (see sections 4.7 and 4.8). An overview of data-analysis techniques used in the current study was also given. The statistical methods as applied to this study, namely EFA (see Figure 4.7), CFA (see section 4.8.4a) and SEM (see Figure 4.8) were discussed. Because of the unique nature of school learners as research participants, it was ensured that the process of undertaking the research adhered to sound ethical principles (see section 4.10).

The next chapters (Chapters 5 and 6) outline the data analysis resulting from these procedures, followed by Chapter 7 that presents the conclusions, recommendations and proposed model for sustainable avitourism.

CHAPTER 5: ANALYSIS OF SUSTAINABLE AVITOURISM DATA: DESCRIPTIVE AND FACTOR ANALYSIS RESULTS

5.1 INTRODUCTION

The previous chapter (Chapter 4) outlined the research design and research method used to achieve the objectives of this study. The following chapters (chapters 5 and 6) report and interpret the results and analysis of the sustainable avitourism data collected for the current study in stages.

The results of the present study are arranged according to the three stages used to analyse the data. The descriptive statistics (Stage 1) provided information on the biographic information of the respondents at secondary schools in Gauteng (Section 5.2) and the current environmental and avitourism literacy of secondary school learners, describing each of the six components (Section 5.3). This relates to the fourth secondary objective, namely –

> To determine secondary school learners' environmental and avi-orientation, environmental and avi-knowledge, environmental and avi-values, behavioural intention, actual pro-environmental and avi-behaviour, and behavioural involvement in birds, the natural environment and avitourism.

Factor analysis (Stage 2) was employed to determine the validity and reliability of the components (constructs) used in the current study (Section 5.4). In Stage 3, SEM was applied to test the conceptual literacy framework for sustainable avitourism empirically, which is presented in Chapter 6.

Figure 5.1 illustrates the data-analysis stages followed in this study.

STAGE 1
DESCRIPTIVE STATISTICS

5.2 DESCRIPTIVE STATISTICS: BIOGRAPHIC INFORMATION OF RESPONDENTS AT SECONDARY SCHOOLS IN GAUTENG

5.2.1 Participating secondary schools in Gauteng
5.2.2 Gender and age of respondents at secondary schools in Gauteng
5.2.3 School grade of respondents at secondary schools in Gauteng
5.2.4 Home language of respondents at secondary schools in Gauteng
5.2.5 Race group of respondents at secondary schools in Gauteng
5.2.6 Synthesis of the biographic profile of respondents at secondary schools in Gauteng

5.3 DESCRIPTIVE STATISTICS: CONSTRUCTS IN THIS STUDY

5.3.1 Results with respect to environmental and avi-orientation of secondary school learners
5.3.2 Results with respect to environmental and avi-knowledge of secondary school learners
5.3.3 Results with respect to environmental and avi-values of secondary school learners
5.3.4 Results with respect to behavioural intention of secondary school learners towards birds, the natural environment and avitourism
5.3.5 Results with respect to actual pro-environmental and avi-behaviour of secondary school learners
5.3.6 Results with respect to the behavioural involvement of secondary school learners in birding and avitourism

STAGE 2
FACTOR ANALYSIS

5.4 VALIDITY AND RELIABILITY OF THE CONSTRUCTS

5.4.1 Results of the factor analysis: Environmental and avi-orientation of secondary school learners
5.4.2 Results of the factor analysis: Environmental and avi-values of secondary school learners
5.4.3 Results of the factor analysis: Behavioural intention of secondary school learners towards birds, the natural environment and avitourism
5.4.4 Results of the factor analysis: Actual behaviour of secondary school learners towards birds, the natural environment and avitourism

Chapter 5

STAGE 3
STRUCTURAL EQUATION MODELLING (SEM)

RESULTS: SEM

6.2 Results of SEM: Building Block 1: The relationships between avi-orientation and bird and environmental knowledge of secondary school learners
6.3 Results of SEM: Building Block 2: The relationships between avi-orientation; bird and environmental knowledge and environmental and avi-values of secondary school learners
6.4 Results of SEM: Building Block 3: The relationships between avi-orientation; bird and environmental knowledge, environmental and avi-values, behavioural intentions and actual behaviour of secondary school learners
6.5 Results of SEM: Refinement of SEM: Covariance relationships
6.6 Results of SEM: Final SEM model
6.7 Results of SEM: The role of behavioural involvement in the full SEM model

Chapter 6

Figure 5.1: Stages of data analysis used in this study

The current chapter presents a discussion of the descriptive statistics (sections 5.2 and 5.3) and the factor analysis results (section 5.4). The biographic information of the participating learners at secondary schools in Gauteng (South Africa) is reported next.

5.2 DESCRIPTIVE STATISTICS: BIOGRAPHIC INFORMATION OF RESPONDENTS AT SECONDARY SCHOOLS IN GAUTENG

In this section, the first part of the descriptive statistics is presented in sections 5.2.1 to 5.2.6, representing *stage 1* of the data analysis (see Figure 5.1). Typical biographic information, such as gender, age, school grade, home language and race group of the respondents, was obtained to characterise and profile the secondary school learners in Gauteng who participated in this study during July to October 2014. These results are discussed next.

5.2.1 Participating secondary schools in Gauteng

The information reported in this study was provided by a total of n = 5 488 secondary school learners (grades 8 to 10) in Gauteng. Seventeen government-funded schools from four school districts, predominantly located in Johannesburg and Pretoria, were identified to participate in the study. All socio-economic groupings are represented within each school district. Figure 5.2 indicates the sample distribution of participating secondary schools in Gauteng.

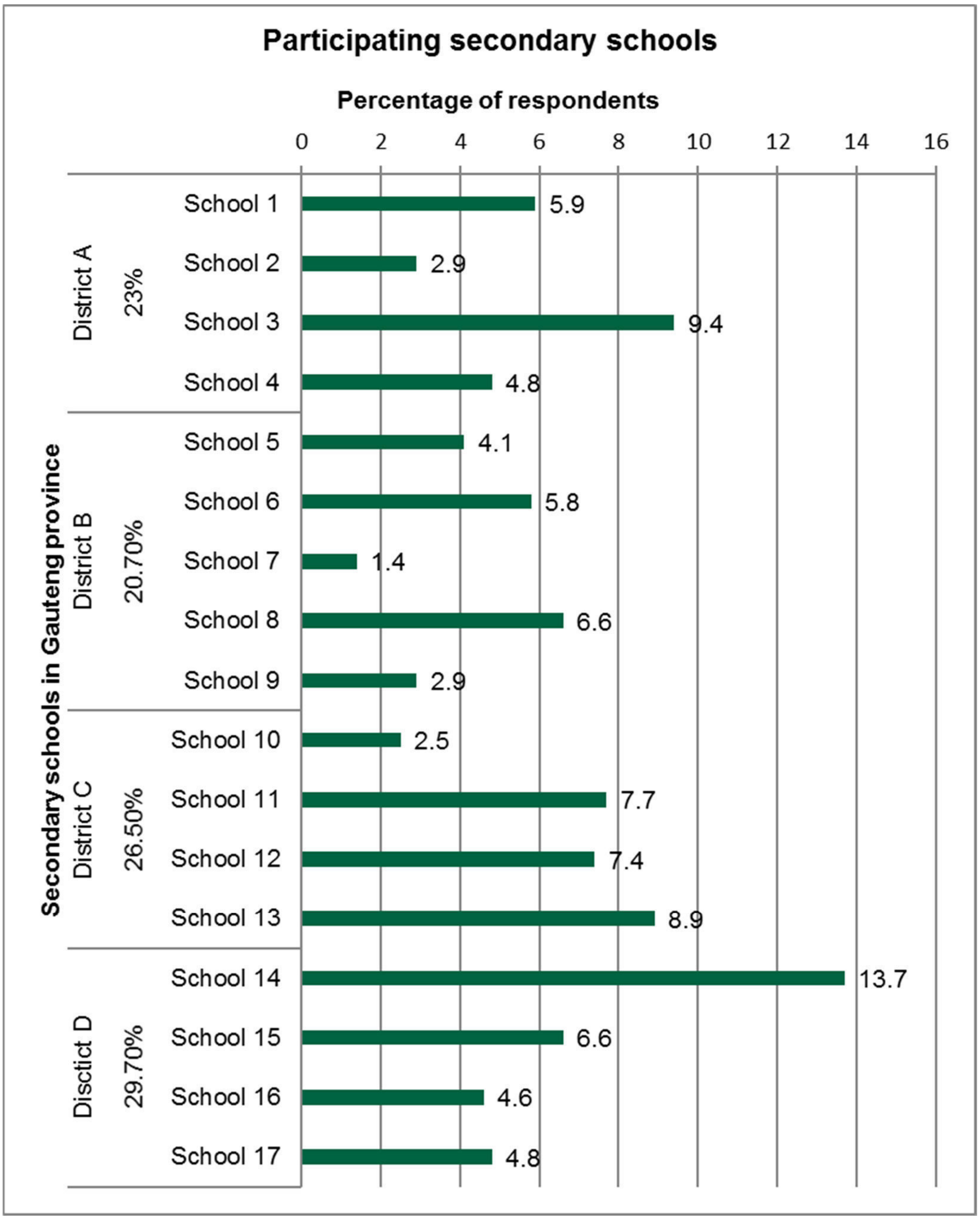

Figure 5.2: Sample distribution of participating secondary schools in Gauteng (%)

Figure 5.2 indicates that the majority of learners completed questionnaires in District D (29.7%), followed by District C (26.5%), District A (23.0%) and District B (20.8%). These results indicate that the sample was relatively equally distributed between the four school districts.

5.2.2 Gender and age of respondents at secondary schools in Gauteng

Figure 5.3 indicates the gender of the participating learners at secondary schools in Gauteng.

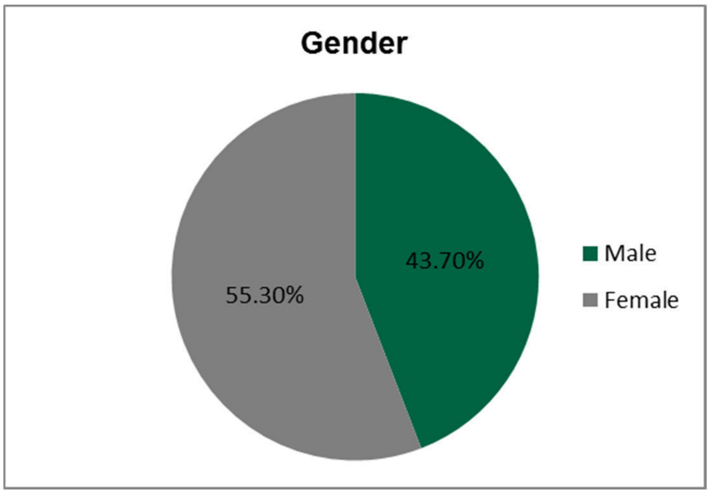

Figure 5.3: Gender of respondents (%)

Just over half of the respondents (55.3%) of the participating secondary schools in Gauteng were female, while 43.7% were male. A relatively even gender ratio was observed, as only a slight larger proportion of female respondents is noticeable in the sample distribution. The sample loss (percentage of learners not providing gender details) was minimal (1.0%).

Figure 5.4 indicates the age of the respondents in this study.

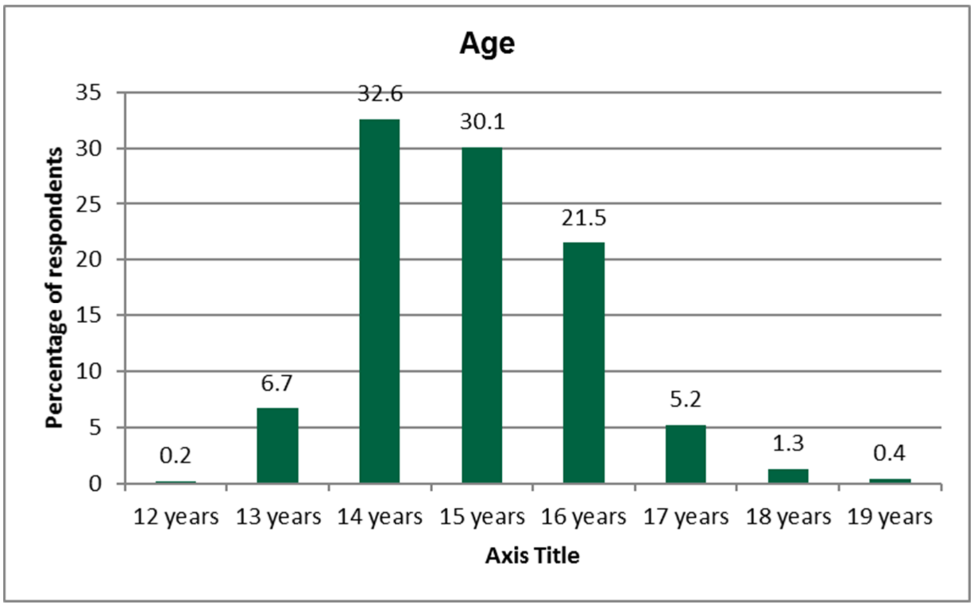

Figure 5.4: Age of respondents

The majority (84.2%) of the learners participating in the study was 14 years (32.0%, 1 791 learners), 15 years (30.1%, 1 653 learners) and 16 years (21.5%, 1 182 learners) of age. As the target population of the study was secondary learners in grades 8 to 10, it was expected that the majority of the learners' ages will be between 14 and 16 years. There were however also a few learners who were 12 to 13 years (0.2% and 6.7%) and 17 to 19 years (5.2%, 1.3% and 0.4%) old. Therefore, equal percentages were respectively younger than 14 (6.9%) and older than 14 (6.9%). The sample loss (percentage of learners not providing their age) was minimal (2.0%).

A classification of secondary school learners according to their school grade is explained next.

5.2.3 School grade of respondents at secondary schools in Gauteng

Figure 5.5 indicates the school grade of the participating learners at secondary schools in Gauteng.

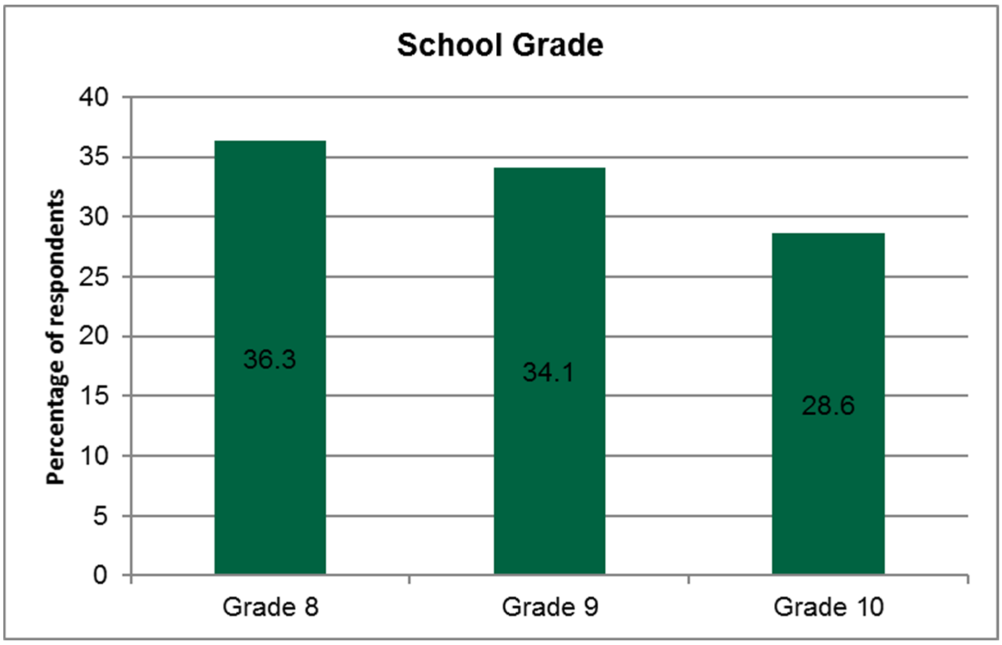

Figure 5.5: School grade of respondents (%)

Grade 8 to 10 secondary school learners in Gauteng were chosen to participate in the study. The sample distribution was relatively equally dispersed between school grade levels (Grade 8, 36.3%; Grade 9, 34.1%; Grade 10, 28.6%). The sample loss was minimal (1.0%).

5.2.4 Home language of respondents at secondary schools in Gauteng

South Africa has 11 official languages, namely Afrikaans, English, Ndebele, Xhosa, Zulu, Pedi, Sesotho, Tswana, Swazi, Venda and Tsonga. Figure 5.6 indicates the home language of the participating learners at secondary schools in Gauteng.

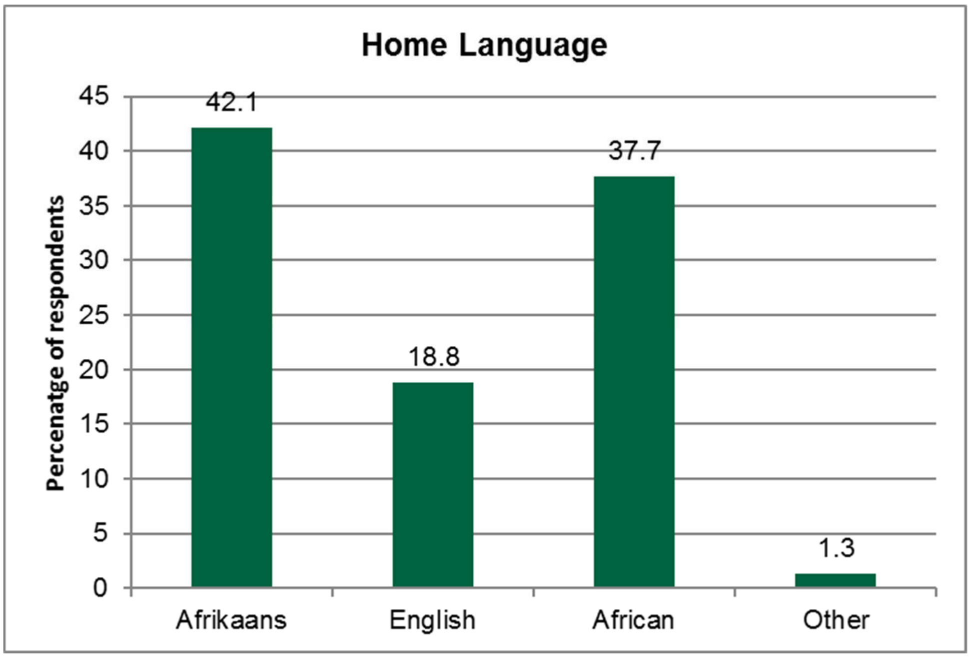

Figure 5.6: Home language of respondents (%)

The majority of the learner sample's home language was Afrikaans (42.1%), followed by African languages (37.7%). The African languages of the respondents consisted predominantly of Tswana (10.8%), Zulu (8.2%), Sesotho (6.5%) and Pedi (5.3%). The learners sample's home languages that were the least represented in the study included Venda (1.3%), Tsonga (1.1%) and Swazi (0.5%). Therefore, all eleven official languages of South Africa were included in the study, as all nine African languages were included in the aggregated percentage of African-speaking learners. The sample loss was minimal (0.3%). The major language groups represented in Gauteng schools were therefore included in the sample.

5.2.5 Race group of respondents at secondary schools in Gauteng

The race groups in South Africa include African, Indian, coloured, white and Asian. Figure 5.7 indicates the race groups of the participating learners at secondary schools in Gauteng.

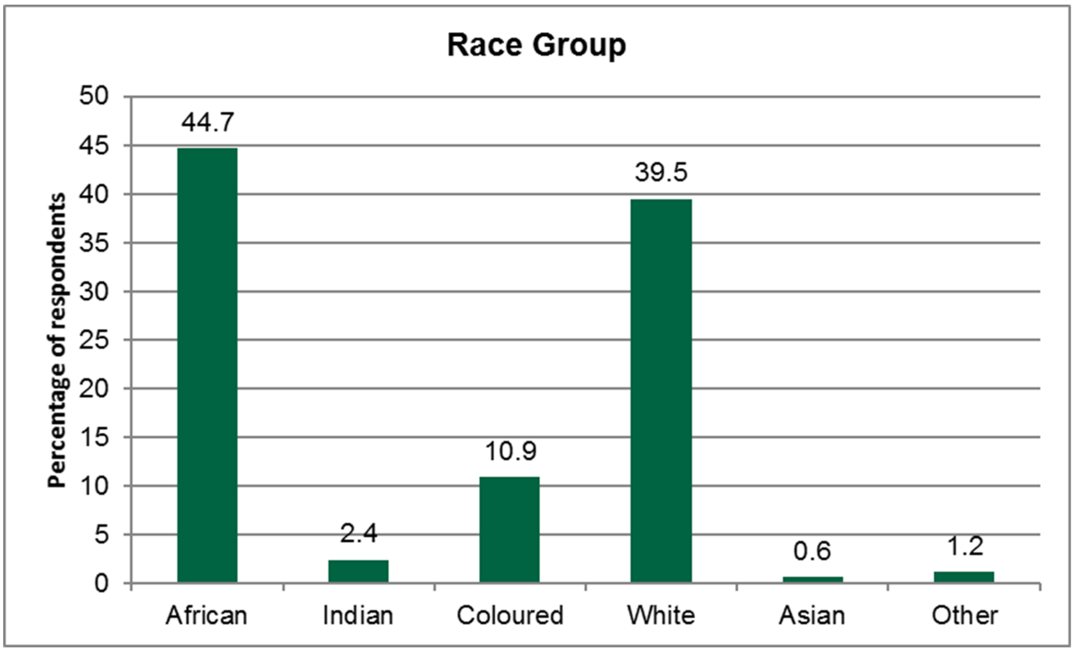

Figure 5.7: Race group of respondents (%)

Figure 5.7 indicates that all the race groups in South Africa participated in the study. Most of the respondents were African (44.7%), followed by the white (39.5%) and coloured (10.9%) race groups. The sample loss was minimal (0.7%).

5.2.6 Synthesis of the biographic profile of the respondents at secondary schools in Gauteng

Table 5.1 provides a detailed synthesis of the biographic profile of the respondents.

Table 5.1: Biographic profile of respondents (n = 5 488)

Item	Category	Frequency	Percentage (%)
Gender	Male	2 397	43.7
	Female	3 037	55.3
	Total	5 434	99
	Missing values	54	1
Age	12	9	0.2
	13	370	6.7
	14	1 791	32.6
	15	1 653	30.1
	16	1 182	21.5
	17	284	5.2
	18	70	1.3
	19	21	0.4
	Total	5 380	98.0

Item	Category	Frequency	Percentage (%)
	Missing values	108	2.0
School grade	Grade 8	1 992	36.3
	Grade 9	1 872	34.1
	Grade 10	1 567	28.6
	Total	5 431	99
	Missing values	57	1
Home language	Afrikaans	2 312	42.1
	English	1 031	18.8
	Ndebele	96	1.7
	Xhosa	124	2.3
	Zulu	451	8.2
	Pedi	289	5.3
	Sotho	354	6.5
	Tswana	593	10.8
	Swati	28	0.5
	Venda	69	1.3
	Tsonga	58	1.1
	Other	69	1.3
	Total	5 474	99.7
	Missing values	14	0.3
Race	African	2 453	44.7
	Indian	134	2.4
	Coloured	599	10.9
	White	2 167	39.5
	Asian	31	0.6
	Other	68	1.2
	Total	5 452	99.3
	Missing values	36	0.7

Table 5.1 indicates a relatively even gender ratio. As expected, the majority of the learners participating in the study were between the ages of 14 and 16 years. Further, the sample distribution was relatively equally dispersed between school grade levels. The majority of the respondents' home language was Afrikaans (42.1%), followed by African languages (37.7%). The respondents' were mostly of the African (44.7%) and white (39.5%) race.

Descriptive statistics of the five environmental and avitourism literacy components (constructs) (i.e. environmental and avi-orientation, environmental and avi-knowledge, environmental and avi-values, behavioural intention and actual behaviour) as well as behavioural involvement as measured in this study are given next.

5.3 DESCRIPTIVE STATISTICS: CONSTRUCTS IN THIS STUDY

In this section, the second part of the descriptive statistics, *stage 1* of the data analysis (see Figure 5.1), is reported in sections 5.3.1 to 5.3.6. Six major constructs (75 items) were measured in this study, namely environmental and avi-orientation, behavioural involvement, environmental and avi-knowledge, environmental and avi-values, behavioural intention and actual behaviour of learners towards birds, the natural environment and avitourism. This section links to the fourth secondary objective of this study, namely –

> To determine secondary school learners' environmental and avi-orientation, environmental and avi-knowledge, environmental and avi-values, behavioural intention, actual pro-environmental and avi-behaviour, and behavioural involvement in birds, the natural environment and avitourism.

Table 5.2 summarises the number of constructs and items included in the present study.

Table 5.2: Research constructs and items

Research construct	Section of questionnaire	Number of items
1 Environmental and avi-orientation (avi-awareness and avi-affinity)	B1	9
2 Behavioural involvement	B2	9
3 Environmental and avi-knowledge	C	10
4 Environmental and avi-values	D	20
5 Behavioural intention	E1	16
6 Actual pro-environmental and avi-behaviour	E2	11
Total		**75**

The research constructs used in this study were conceptualised in the literature review (see chapters 2 and 3). Descriptive statistics for each of the constructs are presented in the next section.

5.3.1 Results with respect to environmental and avi-orientation of secondary school learners

This study requested secondary school learners (n = 5 488) to rate their level of agreement (agreement scale ranging from 'strongly disagree' to 'strongly agree') with nine statements according to their avi-orientation (avi-awareness and avi-affinity) (section 4.4). The avi-awareness scale (items B1.5 and B1.6) used for the purpose of this study reflects the general impression of or consciousness about the general importance and sustainability of birds and their natural habitat (cf. Larson, Green & Castleberry, 2011), whereas avi-affinity reflects on a natural inclination or attraction to or personal interest in birds and the natural habitat of birds (cf. Larson, Green & Castleberry, 2011).

The secondary school learners' awareness of and affinity towards birds and their natural habitat are shown in Figure 5.8.

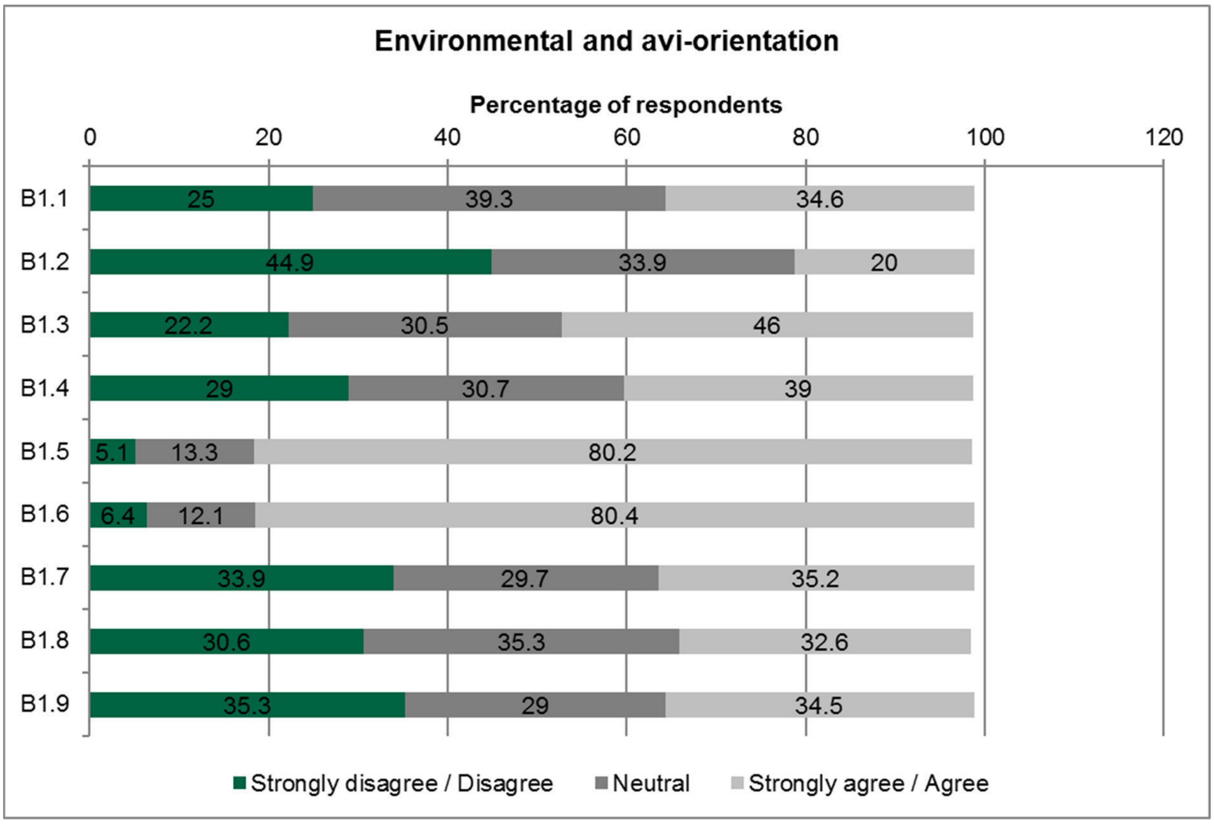

Figure 5.8: Environmental and avi-orientation of respondents (%)

Figure 5.8 displays a fairly high consciousness among the secondary school learners about the general importance and sustainability of birds and their natural habitat. In fact, eight in every ten learners were aware of birds and birds' habitat, as the learners strongly agreed or agreed that people need to take better care of birds (B1.5; 80.2%) and bird habitats (B1.6; 81.4%). Furthermore, almost half (46.0%) of the learners were interested in learning new ways to help protect birds (B1.3).

However, the secondary school learners' cognisance of the importance of birds and bird habitat, according to the results shown in Figure 5.8, had clearly not transcended into the desire to improve comprehension levels regarding birds and their natural habitats. In this regard, only 20.0% and 32.6% of the learners agreed or strongly agreed that they enjoy reading about birds (B1.2) and learning about natural bird habitats (B1.8), respectively. When it comes to personal sacrifices, only 39.0% of the learners seemed willing to give up their own money to save birds (B1.4), while 34.5% indicated that they would voluntarily clean parks in their neighbourhood to help birds (B1.9). From an avitourism perspective, only 35.2% of the learners said that they would like to spend time in places where birds live (B1.7). Overall, the avi-affinity of the learners seemed rather gloomy and poses clear challenges to transform the noteworthy emotional interest of learners towards birds and their habitat into more active interest.

5.3.2 Results with respect to environmental and avi-knowledge of secondary school learners

In this study, basic knowledge of birds, bird habitat and avitourism was investigated. In this section, questions were developed to measure different aspects (or different topics) of birds and environmental knowledge, as discussed in previous literature (Bögeholz, 2006:74). Learners' understanding of birds and the environment was tested using a five-point multiple-choice answer approach, allowing learners to select the correct answer from the various listed choices. For analysis purposes, the correct answers demonstrate the knowledge comprehension level of learners regarding birds, bird habitat and avitourism. Figure 5.9 displays the proportion (%) of learners who were able to provide correct answers to the multiple-choice questions related to basic knowledge of birds and their natural environment.

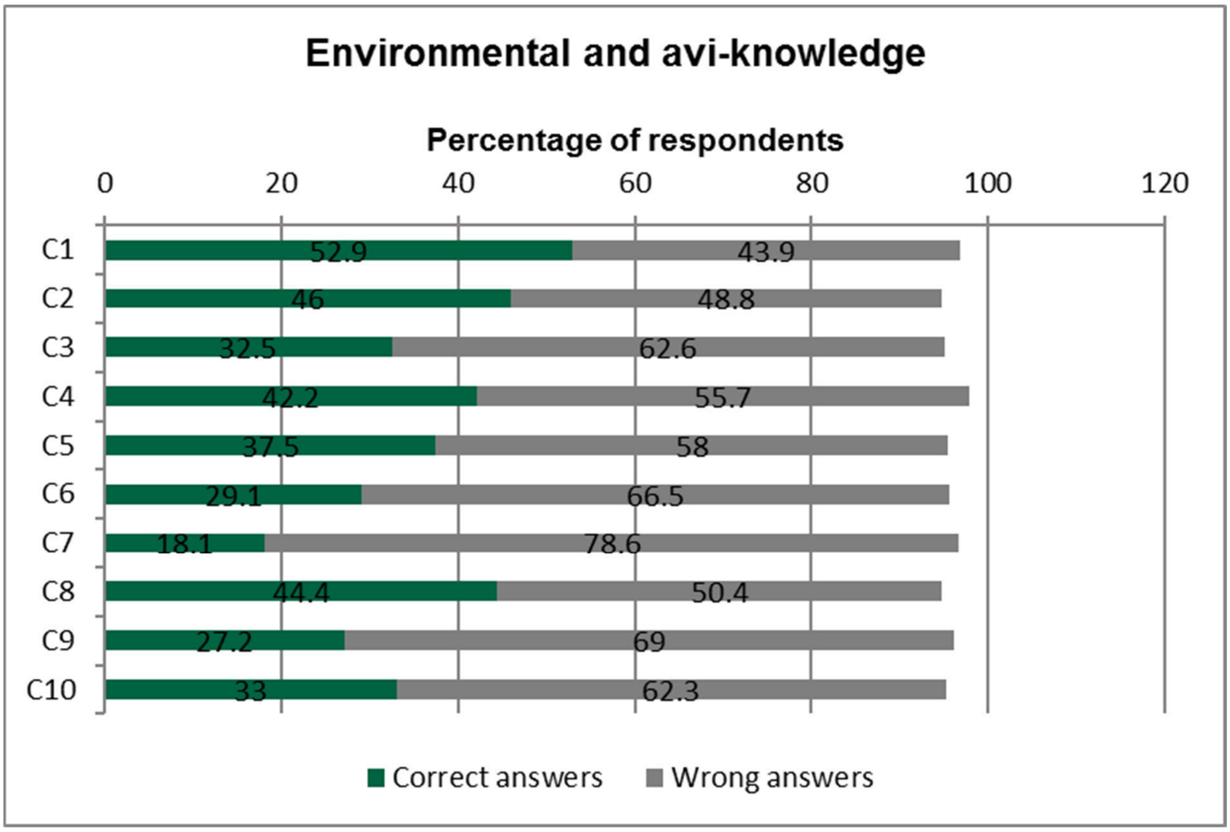

Figure 5.9: Environmental and avi-knowledge of respondents (%)

As illustrated in Figure 5.9, with regard to the learners' (i) basic knowledge of birds in South Africa (C1, C9), 52.9% of the learners were able to identify the blue crane as the national bird of South Africa, while only a third (33.0%) were aware of the number of bird species (more than 950) in South Africa.

Furthermore, the learners performed below average with regard to (ii) knowledge of learners regarding environmental problems impacting on birdlife (C2, C4, C5). In this regard, only 37.5% viewed the destruction of bird habitat as the main possible reason for the extinction of bird species, while less than half (46.0%) of the learners were aware that the national bird is on the list of endangered bird species.

With regard to (iii) basic knowledge of the bird's role in the environmental system, only 29.1% of the learners understood the role of raptors or vultures preying on other animals or eating meat from carcasses.

Learners exhibited average (iv) action-specific environmental knowledge (C8), as 44.4% identified actions, such as improving bird habitat, protecting indigenous trees where birds can breed and eat, and keeping rivers unpolluted, as actions that will improve the numbers of vulnerable bird species.

With regard to (v) basic knowledge of the natural habitat of birds (C7), only 18.1% of the learners answered correctly. Lastly, only three in every 10 learners illustrated (vi) knowledge of birding tourism and responsible behaviour when birding.

The dichotomous data (correct versus incorrect answers) were converted by using the sum of all the correct items for each individual learner, for the 10 questions, and calculating the corresponding percentage value used as a continuous variable. This assessment outcome shows very low knowledge levels regarding birding and the natural environment. Considering the overall knowledge levels, the participating learners' scored an average knowledge comprehension mark of 37.47%. This result is consistent with the results of previous studies (Alp *et al*., 2006:214; Coyle, 2005:iv; Frick *et al*., 2004:1609; Haron *et al*., 2005:435; Levine & Strube, 2012:316; McBeth & Volk, 2010:61) conducted on general environmental knowledge. For example, school learners' scores on environmental knowledge in North America (McBeth & Volk, 2010:61) and in Turkey (Alp *et al*., 2006:214) revealed a relatively low to moderate ecological understanding.

If secondary school learners are going to make informed decisions about the sustainability of birds and their natural habitat, they must be equipped with fundamental knowledge of birds and the natural environment as a whole. However, an increase in secondary school learners' knowledge of birds and the environment may raise concerns about birds and the natural environment, but it does not necessarily result in pro-environmental behaviour. This opinion is supported by Zsóka *et al*. (2013:127), who advocate that changes in environmental and avi-values are necessary drivers for environmental action and might influence pro-environmental behaviour. Environmental and avi-values are discussed next.

5.3.3 Results with respect to environmental and avi-values of secondary school learners

Personal values are the principles, standards, qualities or beliefs that are important to people and influence and guide their behaviour. With specific reference to this study, values represent the unconditional likes and dislikes of learners or their concerns, beliefs and attitudes towards and relationship with birds and their environment. Environmental values in particular are regarded as crucial determinants of environmental behaviour (Boeve-de Pauw & Van Petegem, 2013:551). Therefore, the more strongly individuals subscribe to environmental and avi-values, the more likely they are to engage in pro-environmental behaviour (Steg & Vlek, 2009:311). Consequently, the study was designed to specifically capture the environmental and avi-values of secondary school learners to determine the extent to which these learners have an affective relationship with the natural bird environment.

Against this background, this study included 20 environmental and avi-value statements which learners were requested to rate using an agreement scale ranging from ‘strongly disagree’ to ‘strongly agree’. The items included in the 2-MEV (Bogner & Wiseman, 2006:253) were adapted for the current study. Items 1 to 10 and 17 represented the preservation of birds and bird habitat, while items 11 to 16 and 18 to 20 characterise the utilisation of the natural environment (see Appendix D, Questionnaire).

Figure 5.10 presents the proportion (%) of learners showcasing agreement, neutral opinion or disagreement regarding the value statements on birding and the environment.

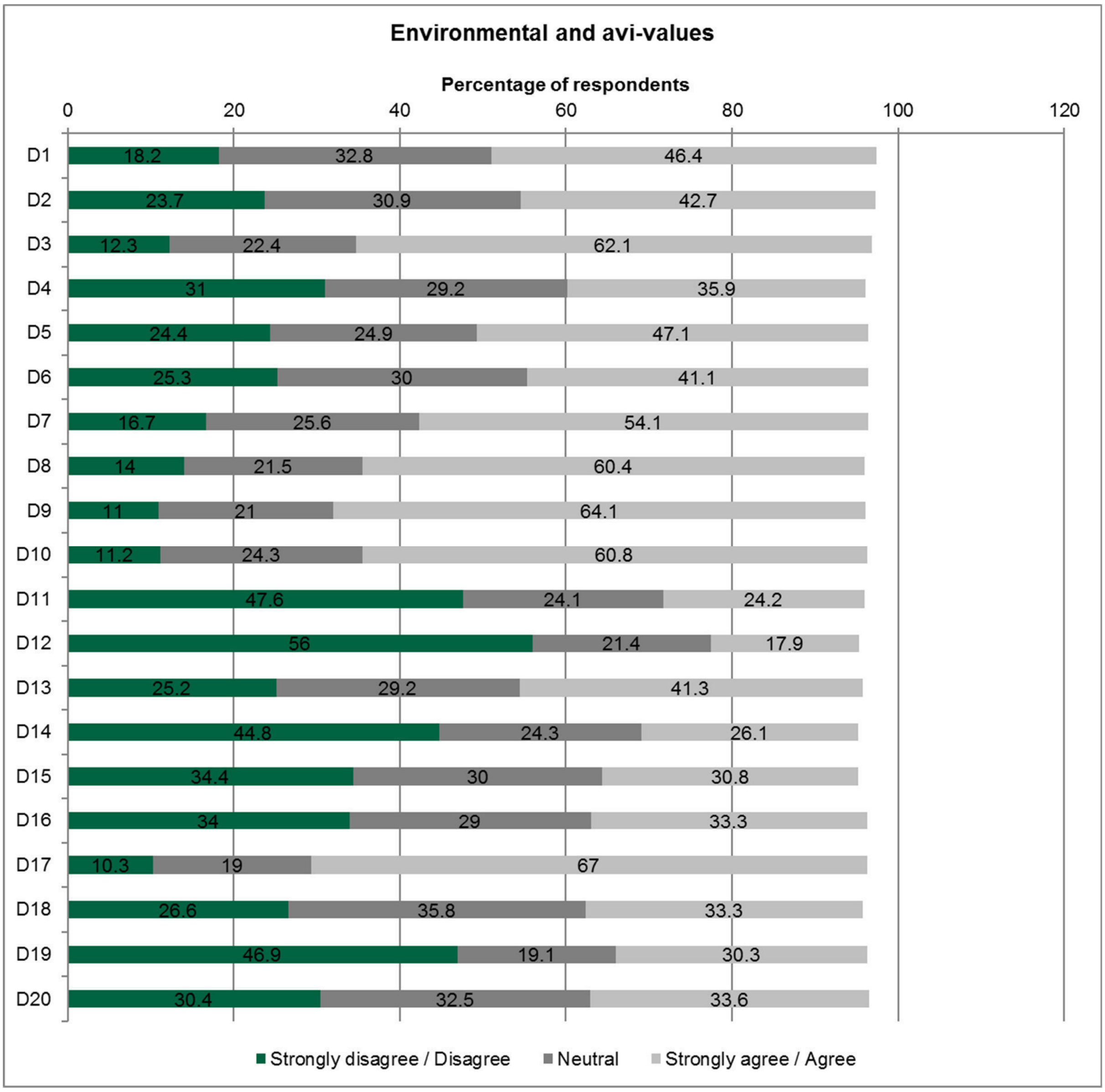

Figure 5.10: Environmental and avi-values of respondents (%)

Firstly, the items representing the preservation of birds and bird habitat and secondly the items representing the utilisation of bird and bird habitat are discussed.

Regarding the preservation of birds and bird habitat, the data presented in Figure 5.10 show clear concerns among more than half of the learners regarding birdlife and the natural environment (living in harmony with nature to prevent the extinction of birds (D3, 62.1%), setting aside areas to protect endangered bird species (D9, 64.1%), solving environmental problems affecting birds (D10, 60.8%) and the protection of plants, birds and animals due to their economic importance (D17, 67.0%). However, the learners' interest in and enjoyment of birds (D4, 35.9%; D5, 47.1%; D6, 41%) and protection of birds' habitat via responsible environmental behaviour (saving water and electricity) (D1, 46.4%; D2, 42.7%) remain dismal.

From Figure 5.10 it is also evident that approximately half of the learners were in disagreement with the statements demonstrating the utilisation of the natural environment. For example, only 24.2% of the learners agreed and 47.6% disagreed with the statement "Humans have the right to change natural bird habitats as they see fit". In addition, only 17.9% of the learners agreed and 56.0% disagreed that bird habitats need to be cleared in order to grow crops. Although almost half (44.8%) of the learners disagreed that "Our planet has unlimited resources" (D14) and that "People worry too much about pollution" (D19, 46.9%), it is however of concern that approximately three in every ten learners believe that natural resources are unrestricted (26.1%), while 30.3% were of the opinion that pollution should not be a major concern.

5.3.4 Results with respect to behavioural intention of secondary school learners towards birds, the natural environment and avitourism

Behavioural intention is defined as "a person's perceived likelihood or subjective probability that he or she will engage in a given behaviour" (Institute of Medicine, 2002:1). Ajzen (1991) argues that behavioural intention reflects how hard a person is willing to try, and how motivated he or she is, to perform the behaviour. For the purposes of this study, intended pro-environmental behaviour simply means behaviour that consciously seeks to minimise the negative impact of secondary school learners' actions on the natural or built world, for example the minimisation of resource and energy consumption that will support the existence of birds, and the reduction of waste production to protect and save birds.

To measure behavioural intention in the context of this study, an environmental psychological approach was applied, whereby measures of pro-environmental behaviour were based on a list of 16 intended pro-environmental behaviours (see Appendix A: Questionnaire; Section E1). For these purposes, a semantic differential scale, ranging from 'not at all true of me' to 'extremely true of me', was used to measure learners' intended pro-environmental and avi-behaviour. These statements served as a proxy for learners' 'willingness to try' and 'motivation to act' in a pro-environmental manner.

Figure 5.11 presents the behavioural intention of secondary school learners towards birds, the natural environment and avitourism.

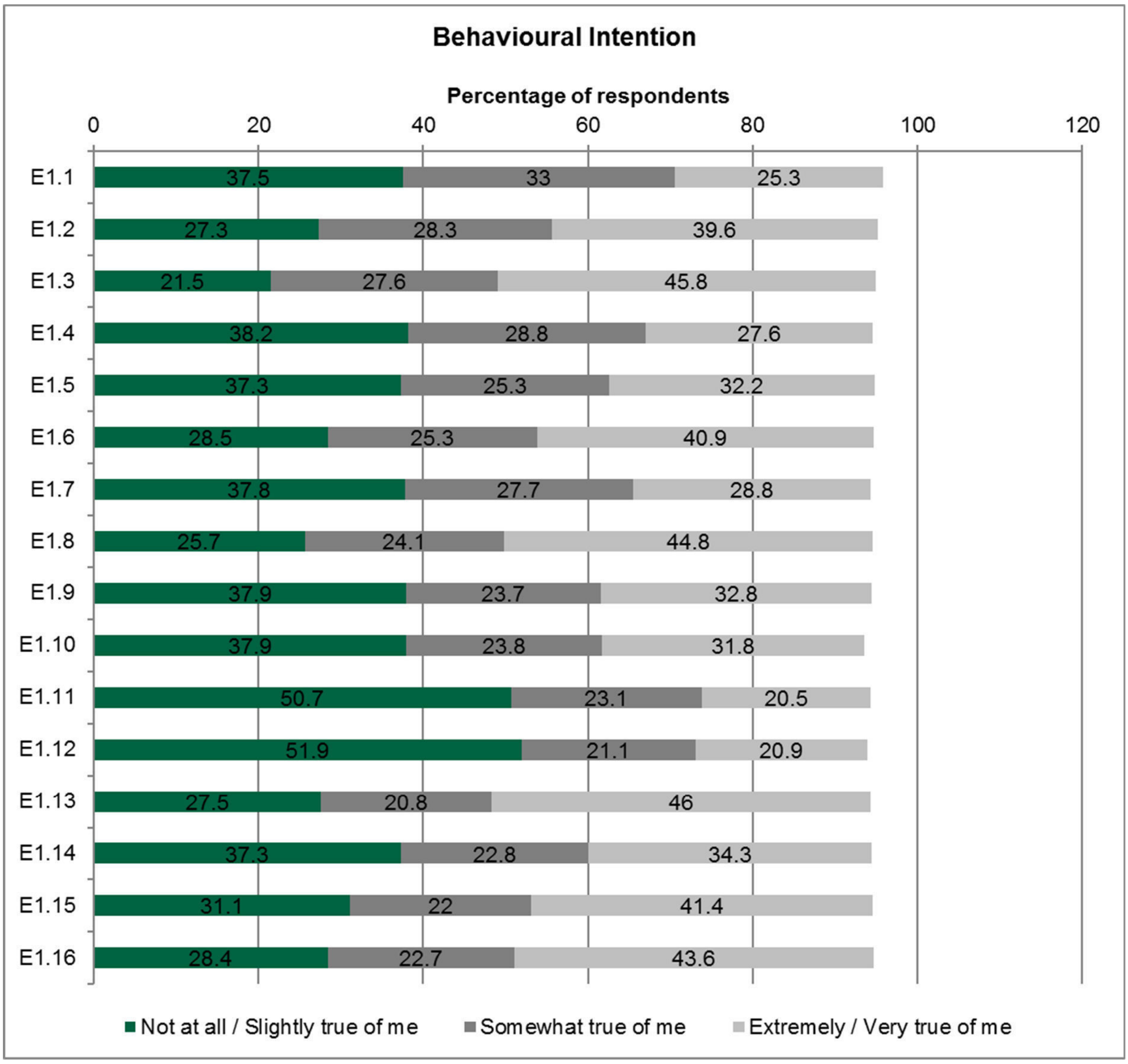

Figure 5.11: Behavioural intention of secondary school learners towards birds, the natural environment and avitourism (%)

Figure 5.11 shows that fewer than half of the learners stated that they are willing to save water for the survival of birds (E1.3; 45.8%) and the preservation of bird habitats (E1.8; 44.8%), while even fewer learners stated that they are willing to save electricity (E1.2; 39.6%) and to recycle rubbish (E1.6; 40.9%) in order to protect birds. Only 27.6% of the learners stated that they are willing to give up their own money to protect bird habitats (E1.4). These results were similar to the results of previous studies conducted on general pro-environmental behavioural intention middle-school learners in the USA (McBeth & Volk, 2010:61); however, it seems that the results of the current study were slightly lower. Furthermore, Boyes *et al*. (2009:668) suggest that for actions involving minimal inconvenience, such as switching off unused electrical appliances and recycling, learners' willingness to act was greater than for actions relating to personal inconvenience, such as using public, rather than private, transport. In the current study, the learners were willing to turn off the water while washing their hands as well as to separate their family's rubbish for recycling, but less inclined to take the bus/walk to places (E1.5; 32.2%), and to give their own money to protect bird habitats.

With regard to behavioural intention regarding birding activities and avitourism, less than half of the learners stated that they are willing to put up a bird house or a bird feeder near their home (E1.13; 46.0%). In addition, 43.6% of the learners said they are inclined to visit a local zoo to learn more about birds (E1.16), while 41.4% said they were willing to go on a birdwatching tour in a nature reserve (E1.15). The learners seemed least interested in joining a local birdwatching club (E1.12; 20.9%) or talking to teachers about a bird club at school (E1.11; 20.5%). Overall, the learners showed a moderate to low intention to act pro-environmentally for the sustainability of birds. These results thus indicate the need for relevant education.

5.3.5 Results with respect to actual pro-environmental and avi-behaviour of secondary school learners

Pro-environmental behaviour is an approach used to help ameliorate environmental problems, such as climate change, conflicts over resources and pollution. Pro-environmental behaviours are described as an attempt to influence individuals' behaviour to act in a more environmentally friendly or environmentally sustainable manner. Therefore, individuals are encouraged to adopt behaviours that are comparatively better for the environment (Osbaldiston & Schott, 2012:258).

To measure the actual pro-environmental behaviour of secondary school learners, a series of 14 statements promoting pro-environmental and avi-behaviour was formulated (see Appendix A: Questionnaire; Section E2). These statements featured avitourism facets that provide environmental benefits to communities and help to educate learners about the value of birds and biodiversity as well as the protection and preservation of bird's natural habitat. More specifically, the series of statements intended to identify the prevalence of 'avitourists' or 'birders' among learners who supposedly should be well educated and have high levels of ecological knowledge and greater awareness of bird conservation issues. Finally, the impact-oriented focus adopted by the study on the actual environmental impact of learner behaviours enabled the identification of targeted behaviours among learners that significantly influence the environment in which birds live.

Figure 5.12 summarises the self-reported behaviour for those secondary school learners who claimed to never, seldom, sometimes, often or always act according to the behavioural descriptors.

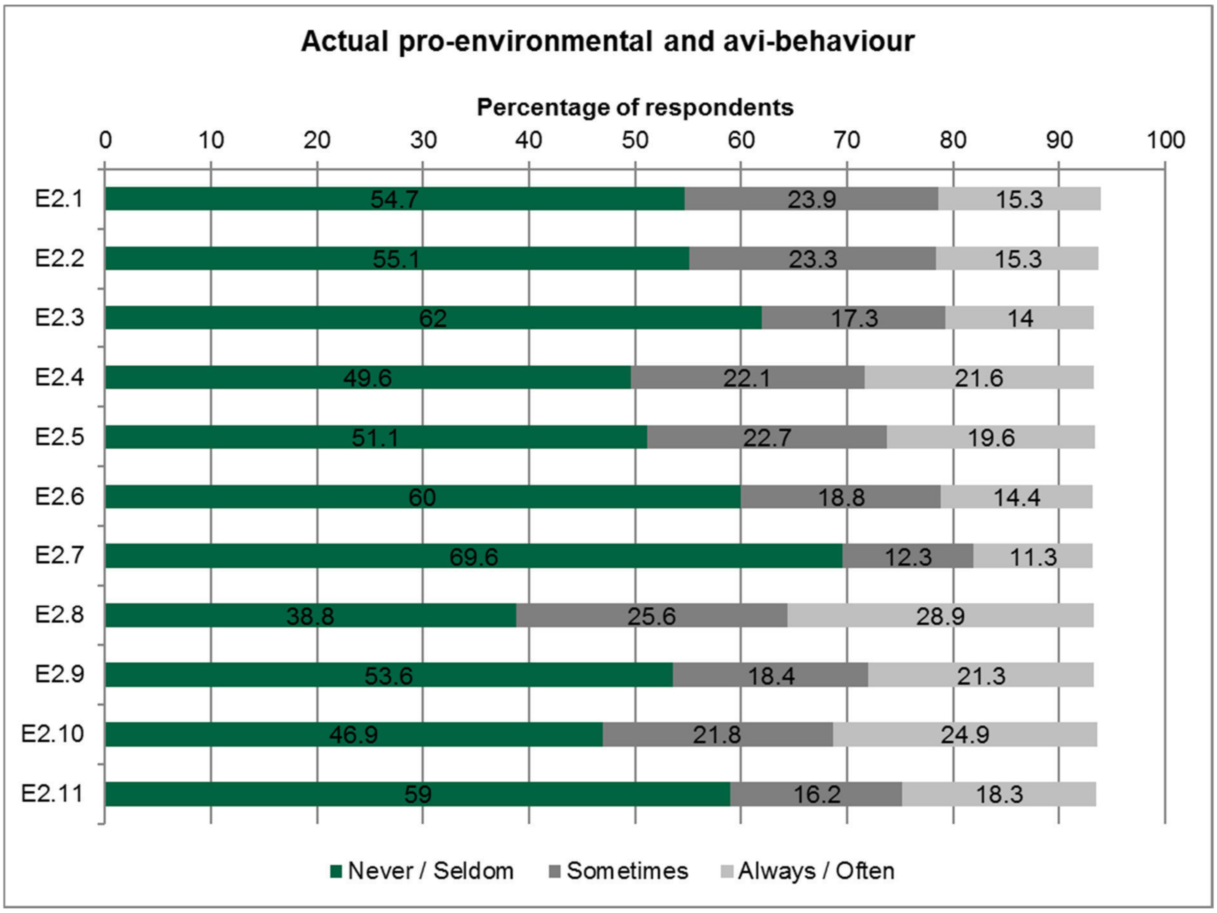

Figure 5.12: Actual pro-environmental and avi-behaviour of respondents (%)

Only a very few learners indicated that they often/always talk to teachers or parents about pollution (E2.1, 15.3%) and how to limit environmental problems that affect bird habitats (E2.2, 15.3%). In addition, only a few learners indicated that the often/always ask someone to recycle in order to limit the production of waste that is bad for birdlife (E2.4, 21.6%). The results showed that the secondary school learners are rather passive relating to the practice of positive sustainable behaviours (action component).

Furthermore, many learners indicated that they never/seldom read about birds (E2.6, 60.0%). Interestingly, Mobley *et al*. (2010:17) noted that participants who reported higher levels of environmental reading reported higher levels of pro-environmental behaviour and therefore suggest that reading can help increase engagement in pro-environmental behaviour.

In addition, collectively (54.5%), more respondents indicated that they have visited a bird park, either sometimes (25.6%) or always/often (28.9%), than respondents who have not visited a bird park (38%) (E2.8). However, more than half (E2.9; 53.6%) of the respondents have never been on a birdwatching tour in a nature reserve, nor have they visited museums (E2.11; 59.0%), and just below half have visited the local zoo (E2.10; 46.9%) to learn more about birds.

Overall, these results indicate that these learners are rather passive with regard to pro-environmental behaviour and that their participation in birding activities was rather low. These results indicate the need to change the environmental and avi-behaviour of secondary school learners to become the responsible citizens and avitourists of tomorrow.

Furthermore, a gap between intended and actual behaviour was observed when comparing Figure 5.11 and Figure 5.12. Whereas more learners showcased intentions to participate in pro-environmental behaviour and avitourism activities, fewer learners showcased actual participation in pro-environmental behaviour and birding activities. For example, two-thirds (E1.6; 66.2%) of the learners indicated that they were willing to separate their family's rubbish for recycling if it could preserve bird habitats, while only 21.6% claimed that they always/often asked someone to recycle some of the things we use to limit the production of waste that is bad for birdlife (E2.4). In addition, while 63.4% of the learners indicated that they were willing to go on a birdwatching tour in a nature reserve (E1.15), fewer learners (E2.9; 39.7%) said they have been on a birdwatching tour in a nature reserve. Similarly, 66.3% of the learners stated that they were willing to visit the local zoo to learn more about birds (E1.16); however, only

46.7% have visited the local zoo to learn more about birds (E2.10). These results are consistent with the findings of Maloney and Ward (1973:585), which indicated relatively high levels of verbal commitment regarding general pro-environmental behaviour, with lower levels of actual commitment towards the environment. Therefore, it can be concluded that most secondary school learners in this study indicated they were willing to do a great deal to help curb pollution problems, but actually do little for the environment. Encouragingly, the research of Stevenson *et al*. (2013:5), of middle school learners in North Carolina (USA), indicates improvement in behaviour scores of learners who spent time outdoors, and suggest that time spent outdoors was the most important positive predictor of change in the behaviour component (actual commitment). It could therefore be suggested that more opportunities should be made available to learners to spend more time outdoors.

5.3.6 Results with respect to the behavioural involvement of secondary school learners in birding and avitourism

Behavioural involvement in birding and avitourism refers to involvement in birdwatching activities by demonstrating access to birding materials, applications (books, bird lists and cell phone applications) and equipment (binoculars) as well as participation in birding courses, clubs, trips and activities. To measure the secondary school learners' involvement in birding and avitourism, eight binary questions were posed to them.

Figure 5.13 displays the percentage of learners affirming their involvement in birding and avitourism.

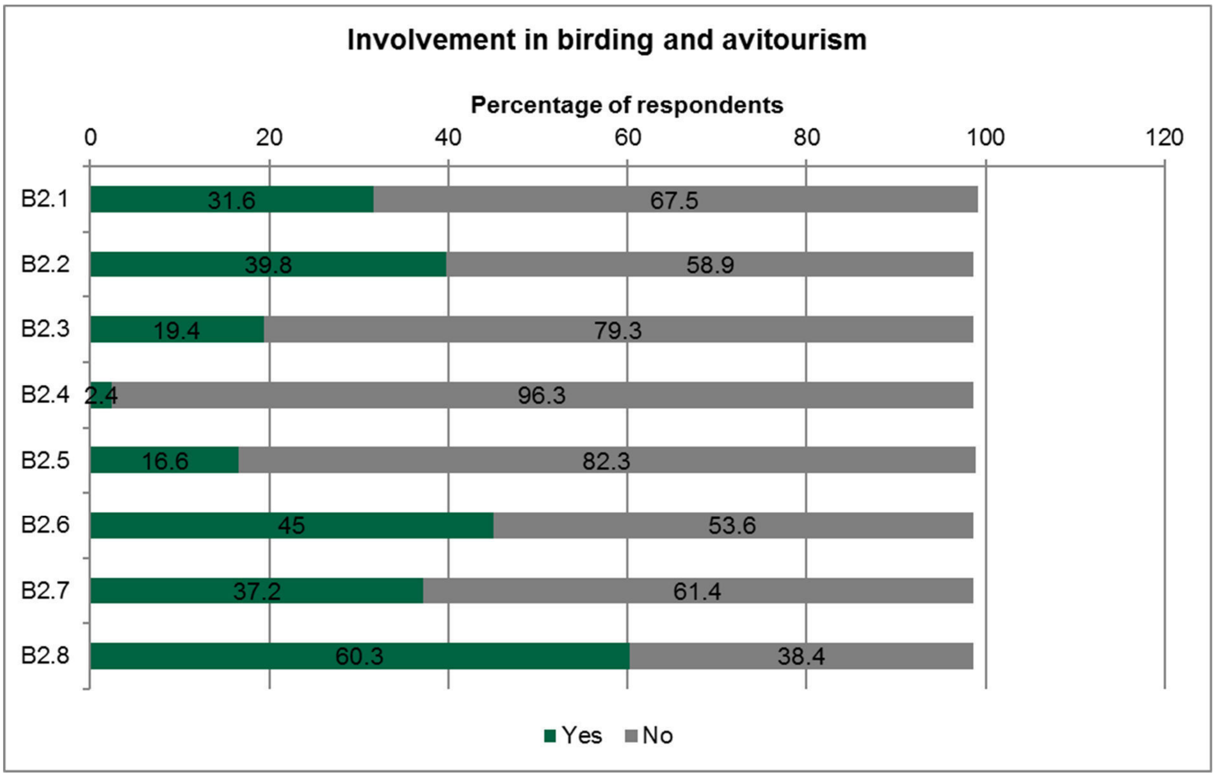

Figure 5.13: Involvement of respondents in birding and avitourism (%)

Only 2.4% of the participating learners proclaimed to belong to a bird club (B2.4), while 19.4% said they had previously attended a bird course (B2.3). Furthermore, 37.2% of the learners said that they had listened to bird sounds via a cell phone application (B2.7), but only 16.6% actually downloaded such an application (B2.5). Interestingly, more learners demonstrated access to birding equipment, such as owning a pair of binoculars (B2.2, 39.8%), than birding materials and applications, such as bird books (B2.1, 31.6%) and cell phone applications (B2.5, 16.6%). In terms of the learners' participation in birding trips and activities, six in every ten learners (60.3%) indicated that they feed birds (B2.8), whereas almost half of the learners (45.0%) indicated that they have participated in trips to watch birds (B2.6).

Considering the overall behavioural involvement of the participating learners in birding and avitourism, an average involvement score of 31.63% was calculated. The dichotomous data (yes versus no answers) were converted into continuous data by firstly taking the sum of all the items, where they answered yes for the eight questions, and then calculating the corresponding percentage value (sum value divided by 8 and then multiplied by 100). The analysis on the involvement in birding and avitourism by the secondary school learners shows a fairly passive involvement.

The results of the factor analysis (validity and reliability of the constructs) are presented next.

5.4 VALIDITY AND RELIABILITY OF THE CONSTRUCTS

Stage 2 of the data analysis (see Figure 5.1), namely the results of the factor analysis, are reported in sections 5.4.1 to 5.4.4. CFA was employed (to sections B1 and D of the questionnaire) to test whether the categories found in previous exploratory research could be confirmed in this study. Firstly, a CFA was conducted. If the CFA did not show acceptable fit, an EFA was subsequently conducted. The aim of the EFA was to investigate the underlying structure of the data and whether or not it could be simplified into one or more factors. Because new items were included in sections E1 and E2 in the questionnaire, only the EFA was employed in these sections. Firstly, the results of the factor analysis on environmental and avi-orientation of the respondents (see Appendix A: Questionnaire; Section B1) are discussed.

5.4.1 Results of the factor analysis: Environmental and avi-orientation of secondary school learners

The research variables of interest included nine questions relating to the environmental orientation of the secondary school learners towards birds and bird habitat, and were informed by Larson, Green & Castleberry's (2011:79) measuring scale used to measure general environmental orientation (section 4.4). Firstly, a CFA was conducted. If the CFA did not show acceptable fit, an EFA was conducted.

a. Confirmatory factor analysis

CFA was employed to test whether the categories (eco-affinity and eco-awareness) found in exploratory research on general environmental orientation (Larson, Green & Castleberry, 2011:79) could be confirmed in this study.

The two categories of environmental orientation (eco-affinity and eco-awareness) were adapted in this study from general environmental orientation to specific environmental orientation towards birds and bird habitat (avi-affinity and avi-awareness). Table 5.3 summarises the initial factorial structure used to measure the learners' orientation towards birds and bird habitat (see Appendix A: Questionnaire; Section B1).

Table 5.3: Initial factorial structure used to measure environmental orientation towards birds and bird habitat of secondary school learners

Avi-affinity	
B1.1	I like to learn about different bird species
B1.2	I like to read about birds
B1.3	I am interested in learning new ways to help protect birds
B1.4	I would give some of my own money to help save birds
B1.7	I like to spend time in places where birds live
B1.8	I like to learn about natural bird habitats
B1.9	I would voluntarily clean parks in my neighbourhood to help birds
Avi-awareness	
B1.5	People need to take better care of birds
B1.6	People need to take better care of bird habitats (the areas where they live)

In CFA, the theory comes first; hence, the outline of the initial factors and items used in the questionnaire, as found in the literature, is provided in Table 5.3. As the avi-awareness category comprised only two items, it could not be subjected to CFA. The model, as derived from the literature (Larson, Green & Castleberry, 2011:79), is illustrated and discussed next.

Figure 5.14 illustrates the model as originally postulated with respect to the items underlying avi-affinity of the secondary school learners**.**

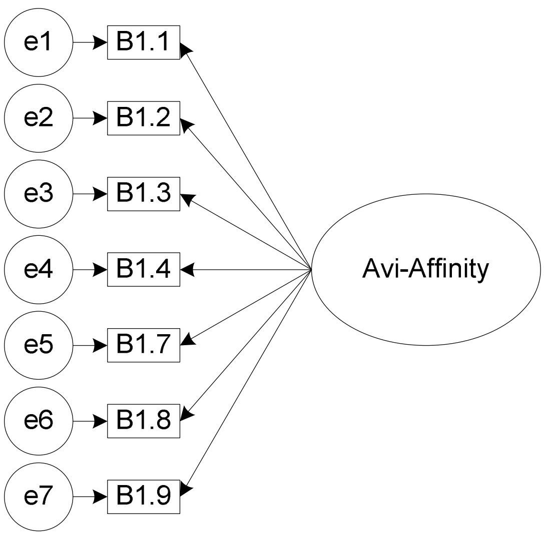

Figure 5.14: The model as originally postulated with respect to factors underlying learners' avi-affinity

In Figure 5.14, the model was initially presented using B1–B4 and B7–B9 for the observed variables, e1–e7, for the error terms associated with the observed variables, and the avi-affinity factor for the latent variable.[49] Finally, the model was tested for consistency with the observed data using an SEM approach. The model was evaluated by goodness-of-fit indices to test whether the proposed model emulates the sample matrix (Raykov & Marcoulides, 2000:95). Table 5.4 provides the goodness-of-fit indices of the measurement model.

Table 5.4: Goodness-of-fit indices of the CFA measurement model of learners' avi-affinity

Model	CMIN (X^2)	df	p	CMIN/df	RMSEA	CFI	TLI	IFI
Goodness-of-fit indices	936.8	14	0.000	66.915	0.110	0.936	0.905	0.936
Indicate acceptable fit	-	-	-	<3	≤ 0.08	≥ 0.90	≥ 0.90	≥ 0.90

The model was fitted to the data and did not indicate acceptable fit. The RMSEA should ideally be below 0.05 and the upper limit of the 90% confidence interval of the RMSEA below 0.08 to indicate good fit, while RMSEA values between 0.05 and 0.08 indicate acceptable fit (Hair *et al*., 2014:579; Raykov & Marcoulides, 2000:36; Hu & Bentler, 1999). Therefore, the RMSEA (0.11) with the lower and upper 90% confidence interval ranging between 0.10 and 0.12 indicated that the model fit was not adequate. Similarly, CFI, TLI and IFI should be above 0.90 for acceptable fit, and above 0.95 for a very good fit (Hair *et al*., 2014:580; Raykov & Marcoulides, 2000:36). The CFI (0.936), TLI (0.905) and IFI (0.936) were all above 0.90, which indicated acceptable fit. The CMIN/df value of 66.915 was larger than 3, therefore also not indicating an acceptable fit. However, when all these fit indices were considered, Model 1 therefore presented an unsatisfactory fit with the observed data and therefore an EFA was conducted. The results of the EFA are discussed next.

b. Exploratory factor analysis

EFA was applied to responses on the nine-item scale. To confirm the appropriateness of EFA, the KMO measure of sampling adequacy and the Bartlett's test of sphericity

[49] Latent variables are "theoretical or hypothetical constructs of major importance in many sciences and typically, there is no direct method for measuring it. Manifestations of a construct can be observed by measuring specific features for the behaviour (such as motivation) on a set of subjects in a particular environment" (Raykov & Marcoulides, 2000:1).

were considered. The KMO value was 0.884, exceeding the recommended minimum value of 0.6 (Kaiser, 1970; Kaiser, 1974) and the Bartlett's test of sphericity (Bartlett, 1954) showed statistical significance, $p < 0.001$, supporting the factorability of the correlation matrix.

The PAF method was used to extract the factors, and this was followed by a promax rotation with Kaiser normalisation. The PAF method revealed the presence of two factors with eigenvalues exceeding 1, cumulatively explaining 61.11% of the variance in the data. The eigenvalue of factor 1 was the highest at 4.40 and explained most of the variance (48.93%). The second factor showed an eigenvalue of 1.10, explaining 12.18% of the variance. Therefore, the first two factors were retained for rotation.

To aid in the interpretation and scientific utility of these two factors, promax rotation with Kaiser normalisation was performed. Table 5.5 indicates the communality estimates and the factor loadings as indicated in the pattern matrix.

Table 5.5: Factor loadings and communality estimates from the EFA of the environmental orientations scale (n = 5 488)

Items used to construct a factor	Communalities	Factor loading	
		1	2
B1.1: I like to learn about different bird species	0.573	0.801	
B1.2: I like to read about birds	0.525	0.796	
B1.3: I am interested in learning new ways to help protect birds	0.530	0.576	
B1.4: I would give some of my own money to help save birds	0.333	0.364	
B1.5: People need to take better care of birds	0.645		0.816
B1.6: People need to take better care of bird habitats (the areas where they live)	0.601		0.799
B1.7: I like to spend time in places where birds live	0.429	0.555	
B1.8: I like to learn about natural bird habitats	0.621	0.800	
B1.9: I would voluntarily clean parks in my neighbourhood to help birds	0.363	0.456	

Extraction method: Principal axis factoring
Rotation method: Promax with Kaiser normalisation
Rotation converged in three iterations

Because the communalities[50] of all the items were above 0.31[51] and they all demonstrated loadings of more than 0.30[52] on one of the two extracted factors, all items were retained for further analysis. The rotated solution revealed the presence of a simple structure (cf. Thurstone, 1947), with both components showing a number of strong factor loadings. Two factors were therefore identified to explain the avi-orientation of the learners towards birds and bird habitat. These two factors were labelled (1) avi-affinity and (2) avi-awareness. Next, the reliability of the new factors was calculated. Table 5.6 indicates the reliability statistics for the two extracted factors.

Table 5.6: Reliability statistics for the two extracted factors representing avi-orientation

Subscale	Description	No. of items	Cronbach's alpha
F1	Avi-affinity	7	0.853
F2	Avi-awareness	2	0.786

Table 5.6 indicates that both factors, avi-affinity (0.86) and avi-awareness (0.79), demonstrated acceptable internal consistency as illustrated by the Cronbach's alpha coefficients.[53]

Table 5.7 reflects the descriptive statistics for the two factors representing the respondents' avi-orientation that were identified as a result of EFA.

Table 5.7: Descriptive statistics for the two extracted factors representing avi-orientation

	Mean *	Median	Std. deviation	Skewness	Kurtosis
F1: Avi-affinity	3.018	3.07	0.847	-0.25	-0.28
F2: Avi-awareness	4.227	4.50	0.872	-1.39	2.05

* The scale indicates 5 = strongly agree and 1 = strongly disagree

A higher mean score indicates a stronger agreement with the factor. The learners' mean level of agreement in terms of the avi-affinity factor was neutral (3.0), while the

[50] Communalities indicate the extent to which an individual item correlates with the rest of the items (HR Statistics, 2015:16)

[51] For this study, one guideline used for considering the inclusion of items in a factor solution was whether they share at least 10% (communality of 0.31) of their variance with the other items under consideration.

[52] Factor loadings of 0.30 and larger were considered significant and used for the interpretation of structure because N > 350 (Hair *et al.*, 2010:117).

[53] "The generally agreed upon lower limit for Cronbach's alpha is 0.70, although it may decrease to 0.60 in exploratory research" (Hair *et al.*, 2010:127).

dispersion of scores around the mean was 0.85. The learners' mean level of agreement in terms of the avi-awareness factor (mean score = 4.2) tended to be at the agree level of the scale, and the standard deviation was 0.87. Therefore, these results indicated that the secondary school learners' general impression, or consciousness about the general importance of the sustainability of birds and bird habitat, was strong. The learners' natural inclination or attraction to or personal interest in birds and their natural habitat (overall avi-affinity) was neutral, indicating the need to transform the emotional interest of learners towards birds and their habitat to a more active interest.

Asymmetry and kurtosis values between -2 and +2 are considered acceptable in order to assume a normal univariate distribution (George & Mallery, 2010). The kurtosis value of avi-awareness (2.05) was slightly outside the threshold values.

The results of the factor analysis conducted for environmental and avi-values (see Appendix A: Questionnaire; Section D) are reported next.

5.4.2 Results of the factor analysis: Environmental and avi-values of secondary school learners

To measure the ecological values of the learners regarding birds and bird habitat, this study used 2-MEV (Bogner & Wiseman, 2006). Bogner and Wiseman's (2006:253) questionnaire battery was designed to measure general environmental values, including the factors utilisation (U) and preservation (P). The general environmental value statements were adapted for the current study to measure specific values of the learners regarding birds and bird habitat (see section 4.4). The research variable of interest included 20 environmental and avi-value items which learners were requested to rate using an agreement scale ranging from 'strongly disagree' (1) to 'strongly agree' (5). The CFA analysis was employed to evaluate whether the factors suggested by Bogner and Wiseman (2006:253) could fit the data of the current study and are discussed next.

a. Confirmatory factor analysis

The purpose of the CFA analysis was to test whether the factors (utilisation and preservation) found in exploratory research on environmental values (Bogner & Wiseman, 2006:249) could be confirmed in this study.

Initial factors and items were derived from the literature. Table 5.8 summarises the initial factorial structure used to measure the learners' values regarding birds and bird habitat (see Appendix A: Questionnaire; Section D).

Table 5.8: Initial factorial structure used to measure values of secondary school learners regarding birds, bird habitat and avitourism

Preservation (P)	
D1	I save water because it is important for the survival of birds
D2	I save electricity because it could decrease air pollution, which endangers many bird species
D3	Various birds species will die out if we do not live in tune with nature
D4	I enjoy trips to the countryside in order to observe birds in their natural habitat
D5	Sitting at the edge of a pond watching birds in flight is enjoyable
D6	It is interesting to know what kinds of birds live close to ponds or rivers
D7	Industrial smoke from factories that kills birds makes me angry
D8	It upsets me to see that bird habitats are destroyed to put up new buildings
D9	We must set aside areas to protect endangered birds species
D10	Society must continue trying to solve even the biggest environmental problems that affect birds
Utilisation (U)	
D11	Humans have the right to change natural bird habitats as they see fit
D12	We need to clear bird habitats in order to grow crops
D13	We should remove garden weeds to help flowers grow
D14	Our planet has unlimited resources
D15	Nature is always able to restore itself
D16	We must build more roads so that people can easily travel to the natural attractions
D17	Our plants, birds and animals are of economic importance and need to be protected
D18	Worrying about birds often holds up development projects (e.g. building houses, shopping centres, etc.)
D19	People worry too much about pollution
D20	Human beings are more important than birds

Table 5.8 outlines the initial factors and items used in the questionnaire, as found in the literature. The CFA that was conducted on the preservation factor is discussed first, followed by the CFA results of the utilisation factor. The model as originally postulated with respect to the factors underlying avi-values (preservation) of secondary learners is illustrated in Figure 5.15.

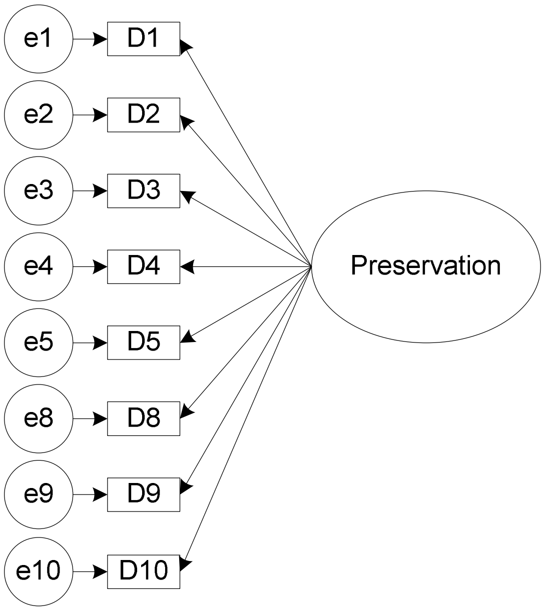

Figure 5.15: Model 1 as originally postulated with respect to factors underlying learners' avi-values (preservation)

As illustrated in Figure 5.15, the model was initially presented using D1–D10 (preservation) for the observed variables, e1–e10, for the error terms associated with the observed variables, and the preservation factor for the latent variable. Table 5.9 provides the goodness-of-fit indices of the measurement model, representing the preservation values of secondary school learners.

Table 5.9: Goodness-of-fit indices of model: Learners' preservation values

Model	CMIN (X^2)	df	p	CMIN/df	RMSEA	CFI	TLI	IFI
Goodness-of-fit indices	3011.3	35	0.000	86.037	0.084	0.857	0.816	0.857
Indicate acceptable fit	-	-	-	<3	≤ 0.08	≥ 0.90	≥ 0.90	≥ 0.90

The model did not indicate an acceptable fit. The RMSEA (0.084) indicated that the model fit was not adequate. The CFI (0.857), TLI (0.816) and IFI (0.857) were all smaller than 0.90, which also indicated that the model did not show acceptable fit. The CMIN/df value of 86.037 was larger than 3, therefore also not indicating an acceptable fit. The model presented an unsatisfactory fit with the observed data and therefore an EFA was applied to the data. Following the same procedure, the CFA results relating to the utilisation values of the learners are reported next.

The CFA model as originally postulated with respect to the factors underlying avi-values (utilisation) of secondary learners areis illustrated in Figure 5.16.

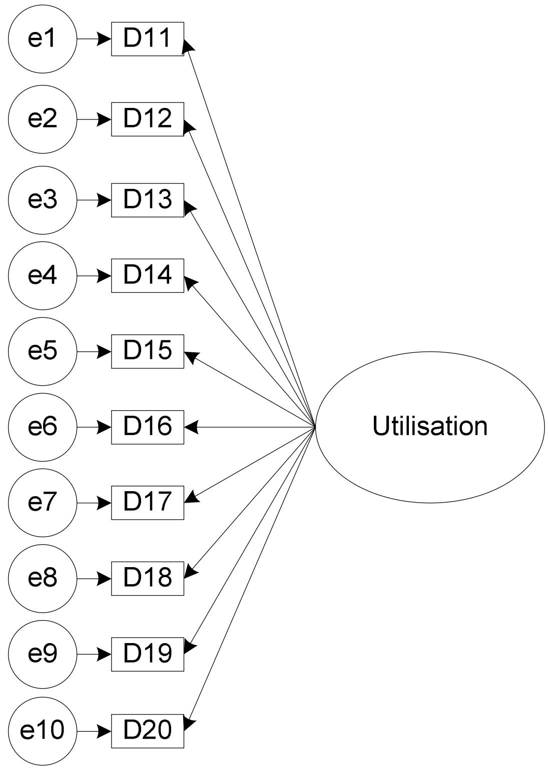

Figure 5.16: Model as originally postulated with respect to factors underlying learners' avi-values (utilisation)

As illustrated in Figure 5.16, the model was initially presented using D11–D20 (utilisation) for the observed variables, e1–e10, for the error terms associated with the observed variables, and the utilisation factor for the latent variable. Table 5.10 provides the goodness-of-fit indices of the model.

Table 5.10: Goodness-of-fit indices of the model: Learners' utilisation values

Model	CMIN (X^2)	df	p	CMIN/df	RMSEA	CFI	TLI	IFI
Goodness-of-fit indices	1205.152	35	0.000	34.433	0.078	0.847	0.804	0.848
Indicate acceptable fit	-	-	-	<3	≤ 0.08	≥ 0.90	≥ 0.90	≥ 0.90

The model did not indicate an acceptable fit. The RMSEA (0.078), with the lower and upper 90% confidence interval ranging between 0.074 and 0.082, indicated that the model provided an acceptable fit. However, the CFI (0.847), TLI (0.804) and IFI (0.848) were all smaller than 0.90, indicating that the model did not show acceptable fit. The

CMIN/df value of 34.433 was larger than 3, therefore also not indicating an acceptable fit. When these fit indices are considered, the model presented an unsatisfactory fit with the observed data.

Because both models for preservation and utilisation presented an unsatisfactory fit with the observed data, an EFA was applied to the data. The results of the EFA are discussed next.

b. Exploratory factor analysis: Environmental and avi-values

EFA was applied to responses of the 20-item scale. The KMO value was 0.898, exceeding the recommended minimum value of 0.6 (Kaiser, 1970; Kaiser, 1974), and the Bartlett's test of sphericity (Bartlett, 1954) showed statistical significance, $p < 0.001$, supporting the factorability of the correlation matrix.

The PAF method was used to extract the factors, and this was followed by a promax rotation with Kaiser normalisation. The PAF revealed the presence of four factors with eigenvalues exceeding 1, cumulatively explaining 51.80% of the variance in the data. The eigenvalue of factor 1 was the highest at 5.16 and explained most of the variance (25.78%). The second factor explained 15.16% of the variance, while the third factor explained 5.62% and the fourth factor 5.24% of the variance, respectively. Therefore, the first four factors were retained for rotation.

To aid in the interpretation and scientific utility of these four factors, promax rotation with Kaiser normalisation was performed. Table 5.11 indicates the communality estimates (after extraction) and the factor loadings as indicated in the pattern matrix.

Table 5.11: Factor loadings and communality estimates from the EFA of the environmental and avi-values scale (n = 5 488)

Items used to construct a factor	Communalities	Factor loading			
		1	2	3	4
D1: I save water because it is important for the survival of birds	0.675				0.811
D2: I save electricity because it could decrease air pollution, which endangers many bird species	0.490				0.631
D3: Various birds species will die out if we do not live in tune with nature	0.352	0.469			
D4: I enjoy trips to the countryside in order to observe birds in their natural habitat	0.514			0.676	
D5: Sitting at the edge of a pond watching birds in flight is enjoyable	0.555			0.713	
D6: It is interesting to know what kinds of birds live close to ponds or rivers	0.553			0.683	
D7: Industrial smoke from factories that kills birds makes me angry	0.510	0.514			
D8: It upsets me to see that bird habitats are destroyed to put up new buildings	0.577	0.673			
D9: We must set aside areas to protect endangered birds species	0.609	0.814			
D10: Society must continue trying to solve even the biggest environmental problems that affect birds	0.506	0.720			
D11: Humans have the right to change natural bird habitats as they see fit	0.306		0.532		
D12: We need to clear bird habitats in order to grow crops	0.377		0.589		
D13: We should remove garden weeds to help flowers grow	0.107	0.320			
D14: Our planet has unlimited resources	0.293		0.510		
D15: Nature is always able to restore itself	0.321		0.566		
D16: We must build more roads so that people can easily travel to the natural attractions	0.322		0.571		
D17: Our plants, birds and animals are of economic importance and need to be protected	0.383	0.631			
D18: Worrying about birds often holds up development projects (e.g. building houses, shopping centres, etc.)	0.194		0.405		
D19: People worry too much about pollution	0.285		0.503		
D20: Human beings are more important than birds neighbourhood to help birds	0.226		0.463		

Extraction method: Principal axis factoring

Rotation method: Promax with Kaiser normalisation
Rotation converged in six iterations

Because the communalities of all the items were above 0.31 and they all demonstrated loadings of more than 0.30 on one of the four extracted factors, all items were retained for further analysis. The rotated solution revealed the presence of four components showing a number of strong factor loadings. Four factors were therefore identified to explain the values of the learners towards birds and bird habitat. These four factors were labelled (1) pro-environmental values, (2) utilisation, (3) enjoyment and (4) critical resources. The reliability of the factors was calculated next. Table 5.12 indicates the reliability statistics for the four extracted factors.

Table 5.12: Reliability statistics for the two extracted factors representing environmental and avi-values

Subscale	Description	No. of items	Cronbach's alpha
F1	Pro-environmental values	7	0.807
F2	Utilisation	8	0.741
F3	Enjoyment	3	0.776
F4	Critical resources	2	0.730

Table 5.12 indicates that the factors pro-environmental values (0.81), utilisation (0.74), enjoyment (0.78) and critical resources (0.73) demonstrated acceptable internal consistency, all above the 0.7 threshold value, as illustrated by the Cronbach's alpha coefficients.

Table 5.13 reflects the descriptive statistics for the four factors representing the respondents' values regarding birds and bird habitat that were identified as a result of EFA.

Table 5.13: Descriptive statistics for the four extracted factors representing environmental and avi-values

	Mean *	Median	Std. deviation	Skewness	Kurtosis
F1: Pro-environmental values	3.700	3.714	0.755	-0.723	0.797
F2: Utilisation	2.789	2.789	0.748	0.069	-0.087
F3: Enjoyment	3.202	3.333	0.999	-0.306	-0.365
F4: Critical resources	3.345	3.500	0.993	-0.304	-0.314

* The scale indicates 5 = strongly agree and 1 = strongly disagree

A higher mean score indicates a stronger agreement with the factor. The learners' mean level of agreement with the pro-environmental values factor tended towards agreement (3.7), while their mean level of agreement was neutral towards the factors utilisation (2.79), enjoyment (3.20) and critical resources (3.35).

These results indicated that the secondary school learner's pro-environmental values seem relatively strong, showing clear concerns among the learners regarding birdlife and the natural environment, for example living in harmony with nature to prevent the extinction of birds, setting aside areas to protect endangered bird species and solving environmental problems affecting birds. However, the learners' level of agreement was neutral regarding the enjoyment of birds in their natural habitat and the protection of bird's habitat via responsible environmental behaviour, such as saving critical resources (water and electricity). It is of concern that the learners' level of agreement was neutral in terms of the statements demonstrating the utilisation of the natural environment. Accordingly, the learners did not, on average, indicate disagreement with statements such as "Humans have the right to change natural bird habitats as they see fit", "Our planet has unlimited resources" and "People worry too much about pollution".

All four factors were normally distributed, as all the skewness and kurtosis values were between -2 and +2.

The results of the EFA performed to determine the respondents' behavioural intentions (see Appendix A: Questionnaire, Section E1) towards birds, bird habitat and avitourism are discussed next.

5.4.3 Results of the factor analysis: Behavioural intention of secondary school learners towards birds, the natural environment and avitourism

For the current study, measures of pro-environmental behavioural intentions were based on the verbal commitment subscale of the CHEAKS (Leeming *et al*., 1995). Only 10 items were adapted to measure the pro-environmental behavioural intentions of the learners regarding birds and bird habitat. These statements served as an indication of the learners' willingness to try and their motivation to act pro-environmentally. An additional nine items (E1.11, E1.13 to E1.20) were added, measuring the pro-environmental behavioural intentions or willingness of the learners to participate in birding activities and avitourism. Following CHEAKS, a semantic differential scale ranging from ‘not at all true of me’ to ‘extremely true of me’ was used to indicate responses to the 16-item scale (after the pilot study, three items were removed) measuring learners’ intended pro-environmental and avi-behaviour (see section 4.4).

An EFA was conducted, using the PAF and promax rotation with Kaiser normalisation. The KMO measure of sampling adequacy was 0.948, which is above the recommended threshold of 0.6 and the Bartlett’s test of sphericity was significant ($p < 0.001$), indicating that a factor analysis was appropriate.

The PAF analysis identified two factors, based on the eigenvalue criterion (eigenvalue > 1), which cumulatively explained 60.68% of the variance. The first factor explained 52.51% of the variance, while the second factor explained 8.16%. Questionnaire items and corresponding factor loadings and communalities are presented in Table 5.14.

Table 5.14: Factor loadings and communality estimates from the EFA of the behavioural intentions scale (n = 5 488)

Items used to construct a factor	Communalities	Factor loading	
		1	2
E1.1: I would be willing to stop buying some products to save the lives of birds	0.497		0.696
E1.2: I would be willing to save electricity if it could avoid killing birds	0.608		0.835
E1.3: I would be willing to save water because it is important for the survival of birds	0.577		0.801
E1.4: I would be willing to give my own money to protect bird habitats	0.535		0.585
E1.5: I would be willing to ride the bus or walk to more places if it could save more birds	0.471		0.519
E1.6: I would be willing to separate my family's rubbish for recycling if it could preserve bird habitats	0.466		0.625
E1.7: I would be willing to give my own money to help protect wild birds	0.536		0.552
E1.8: I would be willing to turn off the water while I wash my hands if it could preserve bird habitats	0.469		0.683
E1.9: I am willing to buy a bird book to assist me in identifying birds	0.639	0.766	
E1.10: I am willing to buy a bird book to learn more about birds and bird habitats	0.672	0.803	
E1.11: I am willing to talk to my teachers about a bird club at school	0.596	0.795	
E1.12: I am willing to join a local birdwatching club	0.601	0.833	
E1.13: I would be willing to put up a bird house or a bird feeder near my home	0.448	0.376	
E1.14: I would be willing to go on a birdwatching tour in my area	0.646	0.780	

E1.15: I would be willing to go on a birdwatching tour in a nature reserve	0.579	0.642	
E1.16: I would like to visit the local zoo to learn more about birds	0.501	0.611	

Extraction method: Principal axis factoring
Rotation method: Promax with Kaiser normalisation
Rotation converged in three iterations

Table 5.14 indicates that the initial communalities were greater than 0.31, sharing at least 10% of their variance with the other items under consideration. The table indicated a number of strong factor loadings (factor loadings of 0.30 and larger were considered significant). Using these criteria, eight items were found to load on the first factor, which was subsequently labelled as intended pro-environmental and avi-behaviour, while eight items loaded on the second factor, which was labelled intended birdwatching behaviour. The reliability (internal consistency) of the factors are reported in Table 5.15.

Table 5.15: Reliability statistics for the two extracted factors representing behavioural intention towards birds, the natural environment and avitourism

Subscale	Description	No. of items	Cronbach's alpha
F1	Intended pro-environmental and avi-behaviour	8	0.894
F2	Intended birdwatching behaviour	8	0.915

Table 5.15 indicates the internal consistency of responses that were assessed by Cronbach's alpha coefficients. Reliability estimates were 0.89 and 0.92 for responses to intended pro-environmental and avi-behaviour and intended birdwatching behaviour, respectively, indicating good reliability.

Table 5.16 reflects the descriptive statistics for the two factors representing the behavioural intentions of secondary school learners towards birds, bird habitat and avitourism as a result of EFA.

Table 5.16: Descriptive statistics for the two extracted factors representing behavioural intention towards birds, the natural environment and avitourism

	Mean *	Median	Std. deviation	Skewness	Kurtosis
F1: Intended pro-environmental and avi-behaviour	3.002	3.000	0.988	-0.177	-0.450
F2: Intended birdwatching behaviour	2.873	3.000	1.088	-0.037	-0.820

* The scale indicates 5 = extremely true of me and 1 = not at all true of me

A higher mean score indicates a stronger agreement with the factor. The learners' mean level of agreement with the intended pro-environmental and avi-behaviour factor was neutral (3.0), while the learners' mean level of agreement with the intended birdwatching behaviour factor (2.87) was slightly below neutral. Therefore, the results indicate that the learners' perceived likelihood that they will engage in a given pro-environmental and avi-behaviour is only moderate. With regard to intended birdwatching behaviour, the learners also showed a moderate to low likelihood to participate, indicating the need to raise the learners' willingness to act for the birds and their habitat.

The two behavioural intention factors towards birds, the natural environment and avitourism were normally distributed, as the skewness and kurtosis values were between -2 and +2.

The factor analysis results for the actual environmental behaviour of the respondents (see Appendix A: Questionnaire, Section E2) are discussed next.

5.4.4 Results of the factor analysis: Actual behaviour of secondary school learners towards birds, the natural environment and avitourism

For the current study, measures of pro-environmental behaviour were based on the actual commitment subscale of the CHEAKS (Leeming *et al.*, 1995). To measure the actual pro-environmental behaviour of the learners regarding birds and bird habitat, seven items of CHEAKS were adapted to the birding context. An additional seven items (E2.8–E2.14), promoting pro-environmental and avitourism behaviour, were formulated to measure the actual behaviour of the learners to participate in birding activities and avitourism. After the pilot study, data were analysed and three items were removed in the final questionnaire. Therefore, 11 items represented the self-reported behaviour for those learners who claimed to never, seldom, sometimes, often or always act according to the behavioural descriptors (section 4.4).

An EFA was applied to the responses of the 11-item scale. The PAF method was used to extract the factors and this was followed by a promax rotation with Kaiser normalisation.

The KMO measure of sampling adequacy (0.927), which was above the recommended threshold of 0.6, and the Bartlett's test of sphericity, which was significant ($p < 0.001$), indicated that a factor analysis was appropriate.

The PAF analysis identified two factors, based on the eigenvalue criterion (eigenvalue > 1), which cumulatively explained 63.27% of the variance. The first factor explained most of the variance (53.76%), while the second factor explained 9.51% of the variance. Questionnaire items and corresponding factor loadings and communalities are shown in Table 5.17.

Table 5.17: Factor loadings and communality estimates from the EFA of the actual behaviour scale (n = 5 488)

Items used to construct a factor	Communalities	Factor loading	
		1	2
E2.1: I have talked to someone about pollution that causes destruction of bird habitats	0.541	0.760	
E2.2: I have talked to someone about how to limit environmental problems that affect bird habitats	0.660	0.844	
E2.3: I have asked someone not to buy products that can cause harm to birds	0.614	0.809	
E2.4: I have asked someone to recycle some of the things we use to limit production of waste that is bad for birdlife	0.545	0.711	
E2.5: I have asked others what I can do to help create a healthy environment that is good for birdlife	0.606	0.678	
E2.6: I read stories that are mostly about birds	0.485	0.497	
E2.7: I have talked to someone about a birdwatching club at school	0.456	0.495	
E2.8: I have visited a bird park	0.502		0.741
E2.9: I have been on a birdwatching tour in a nature reserve	0.592		0.783

E2.10: I have visited the local zoo to learn more about birds	0.552		0.704
E2.11: I have visited the local museum to learn more about birds	0.528		0.582

Extraction method: Principal axis factoring
Rotation method: Promax with Kaiser normalisation
Rotation converged in three iterations

Table 5.17 indicates that the initial communalities were greater than 0.31, sharing at least 10% of their variance with the other items under consideration. The table indicates a number of strong factor loadings (factor loadings of 0.30 and larger were considered significant). Using these criteria, seven items were found to load on the first factor, which was subsequently labelled as pro-environmental and avi-behaviour, while four items loaded on the second factor, which was labelled birdwatching behaviour. The estimates of internal consistency are reported in Table 5.18.

Table 5.18: Reliability statistics for the two extracted factors representing actual behaviour towards birds, the natural environment and avitourism

Subscale	Description	No. of items	Cronbach's alpha
F1	Pro-environmental and avi-behaviour	7	0.895
F2	Birdwatching behaviour	4	0.825

Table 5.18 indicates the internal consistency of responses that were assessed by Cronbach's alpha coefficients. Reliability estimates were 0.90 and 0.83 for responses to pro-environmental and avi-behaviour and birdwatching behaviour, respectively, indicating good reliability.

Table 5.19 reflects the descriptive statistics for the two factors representing the actual behaviour of the learners towards birds, bird habitat and avitourism as a result of EFA.

Table 5.19: Descriptive statistics for the two extracted factors representing actual behaviour towards birds, the natural environment and avitourism

	Mean *	Median	Std. deviation	Skewness	Kurtosis
F1: Pro-environmental and avi-behaviour	2.177	2.000	0.975	0.582	-0.435
F2: Birdwatching behaviour	2.458	2.500	1.108	0.401	-0.780

* The scale indicates 5 = always and 1 = never

The mean score indicates how often the learners engage in a given behaviour. The learners seldom engaged in both the pro-environmental and avi-behaviour (2.18) and birdwatching behaviour (2.46) factors. These results indicate that these respondents are rather passive with regard to pro-environmental behaviour, and that their participation in birding activities was rather low.

The two actual behavioural factors towards birds, the natural environment and avitourism are normally distributed, as all the skewness and kurtosis values were between -2 and +2.

5.5 CONCLUSION

The first two stages of the data analysis (see Figure 5.1), the descriptive statistics and the factor analysis results were presented in this chapter. The chapter was organised to address the fourth secondary objective of the present study, namely –

> To determine secondary school learners' environmental and avi-orientation, environmental and avi-knowledge, environmental and avi-values, behavioural intention, actual pro-environmental and avi-behaviour, and behavioural involvement in birds, the natural environment and avitourism.

The main results emanating from this chapter are synthesised below:

- The biographic information of the respondents (Grade 8, 9 and 10 learners) at secondary schools: A relatively even gender ratio was observed with a slight larger proportion of female learners (55.3%). The majority of the learners participating in the study were between the ages of 14 and 16 years. The majority of the respondents' home language was Afrikaans (42.1%), followed by African languages (37.7%) and English (18.8%). The respondents were mostly of the African (44.7%) and white (39.5%) race, followed by coloured learners (10.9%).
- Current environmental and avitourism literacy:
    - Fairly high levels of affection (affinity) were discernible among the learners towards birding and their natural environment. However, these positive sentiments have clearly not transcended into the desire to improve comprehension levels regarding birds and their natural habitats.

- The overall avi-awareness and avi-affinity of the learners towards birds and their natural habitat were rather gloomy and pose clear challenges to transform the noteworthy emotional interest of learners towards birds and their natural habitat into more active interest.
- Secondary school learners' average environmental and avi-knowledge levels. Considering the overall knowledge levels, the participating learners scored a knowledge comprehension mark of 37.47%.
- Regarding environmental and avi-values, the majority of secondary school learners showed concerns regarding birdlife and the natural environment (living in harmony with nature to prevent the extinction of birds, setting aside areas to protect endangered bird species, solving environmental problems affecting birds and the protection of plants, birds and animals due to their economic importance). However, the learners' interest in and enjoyment of birds and the protection of bird habitats via responsible environmental behaviour (e.g. saving water and electricity) remain dismal.
- It is evident that approximately half of the learners were in disagreement with the statements demonstrating the utilisation of the natural environment. For example, the majority of the learners disagreed with the statement "Humans have the right to change natural bird habitats as they see fit". However, it is of concern that approximately three in every ten learners believe that natural resources are unrestricted, while almost a third were of the opinion that pollution should not be a major concern.
- Fewer than half of the learners were willing to save water for the survival of birds and the preservation of bird habitats, while fewer learners were willing to save electricity and to recycle rubbish in order to protect birds. The interest in and enjoyment of birds and the protection of bird habitats via responsible environmental behaviour (saving water and electricity) remain dismal among secondary school learners. Regarding the behavioural intention towards birding and avitourism, fewer than half of the learners were willing to put up a birdhouse or a bird feeder near their home, were inclined to visit a local zoo to learn more about birds, and were willing to go on a birdwatching tour in a

nature reserve. The learners therefore showed a poor willingness or likelihood to act pro-environmentally.

  - The learners showed a relatively low inclination to read about birds or to undertake birding trips to museums, nature reserves or the zoo. These results indicated that these learners were rather passive with regard to pro-environmental behaviour, and that their participation in birding activities was rather low.
  - The learners' intended and actual pro-environmental behaviour differed significantly. Whereas more learners displayed intentions to participate in pro-environmental behaviour and avitourism activities, fewer learners displayed actual participation in pro-environmental behaviour and birding activities.

- Overall, regarding the behavioural involvement of the participating learners in birding and avitourism, an average involvement score of 31.63% was calculated. The analysis of the involvement in birding by secondary school learners showed passive involvement.

This chapter also reported on the factor analyses (confirmatory and exploratory) that were conducted on various sections of the questionnaire. It provided the information with regard to the construct validity and reliability of the questionnaire. Because all the Cronbach's alpha coefficients reported in this section indicated good reliability, it was possible to continue further analysis of the data. The conceptual framework, as outlined in Chapter 3, was tested empirically, and this is reported in the next chapter (*Stage 3* of the data analysis in Figure 5.1). A multivariate data-analysis technique, namely SEM, was applied, and these results are reported in Chapter 6.

CHAPTER 6: ANALYSIS OF SUSTAINABLE AVITOURISM DATA AND DISCUSSION OF STRUCTURAL EQUATION MODELLING RESULTS

6.1 INTRODUCTION

To achieve the objectives of this study, the methodological procedure was operationalised in three phases. In *phase 1*, the body of knowledge on sustainable avitourism, as well as mechanisms and approaches that were identified to facilitate behavioural change towards birds and the natural environment, was outlined (Chapter 2). In *phase 2*, based on the literature review, a conceptual literacy framework, aimed at facilitating behavioural change within secondary school learners' behaviour towards birds, the natural environment and avitourism was developed (Chapter 3). In *phase 3* of the current research, the conceptual literacy framework for sustainable avitourism, had to be tested empirically, which was the focus of this chapter. Chapter 6 links to the fifth secondary objective, namely –

> To test the conceptual literacy framework empirically for sustainable avitourism though structural equation modelling (SEM).

The stages of data analysis used in the present study were illustrated in Figure 5.1. Stages 1 and 2 (descriptive statistics and factor analysis) were presented in Chapter 5, while stage 3 (SEM) is presented in Chapter 6.

The initial structural model was developed, based on the conceptual literacy framework for sustainable avitourism (refer to Figure 3.1), and are presented in Figure 6.1.

Figure 6.1: Initial structural model based on the conceptual framework for sustainable avitourism

To gain more insight into the relationships within the model, it was decided to make use of a stepwise process to test the relationships within and between each of the building blocks of the model.

This section therefore outlines the stepwise process that was followed to understand the relationships between the building blocks of the final structural equation model (SEM). The building blocks in the conceptual framework are illustrated in Figure 6.2.

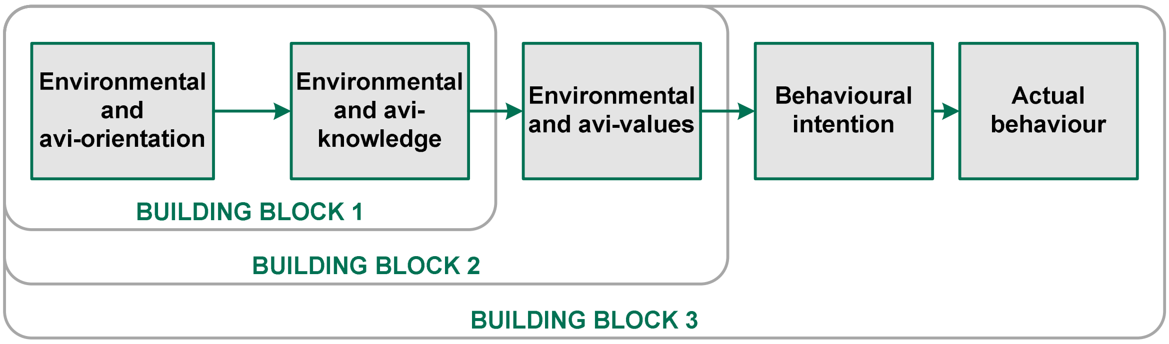

Figure 6.2: Building blocks in the conceptual literacy framework for sustainable avitourism

Figure 6.2 represents the building blocks of the conceptual framework for environmental and avitourism literacy leading to sustainable avitourism that was outlined in detail in the literature review (see Chapter 3). In order to understand the role and relationships of each of the constructs in the proposed conceptual model, the relationships within and across each of the building blocks towards the final model were tested. In building block 1 the relationship between avi-affinity, avi-awareness and 'environmental and avi-knowledge' were tested. In building block 2 the 'environmental and avi-values' construct were added, and in building block 3 'behavioural intentions' and 'pro-environmental and avi-behaviour' were added and empirically tested. The structure and flow of the results of SEM (stage 3 of the data analysis), as reported in this section, are illustrated in Figure 6.3.

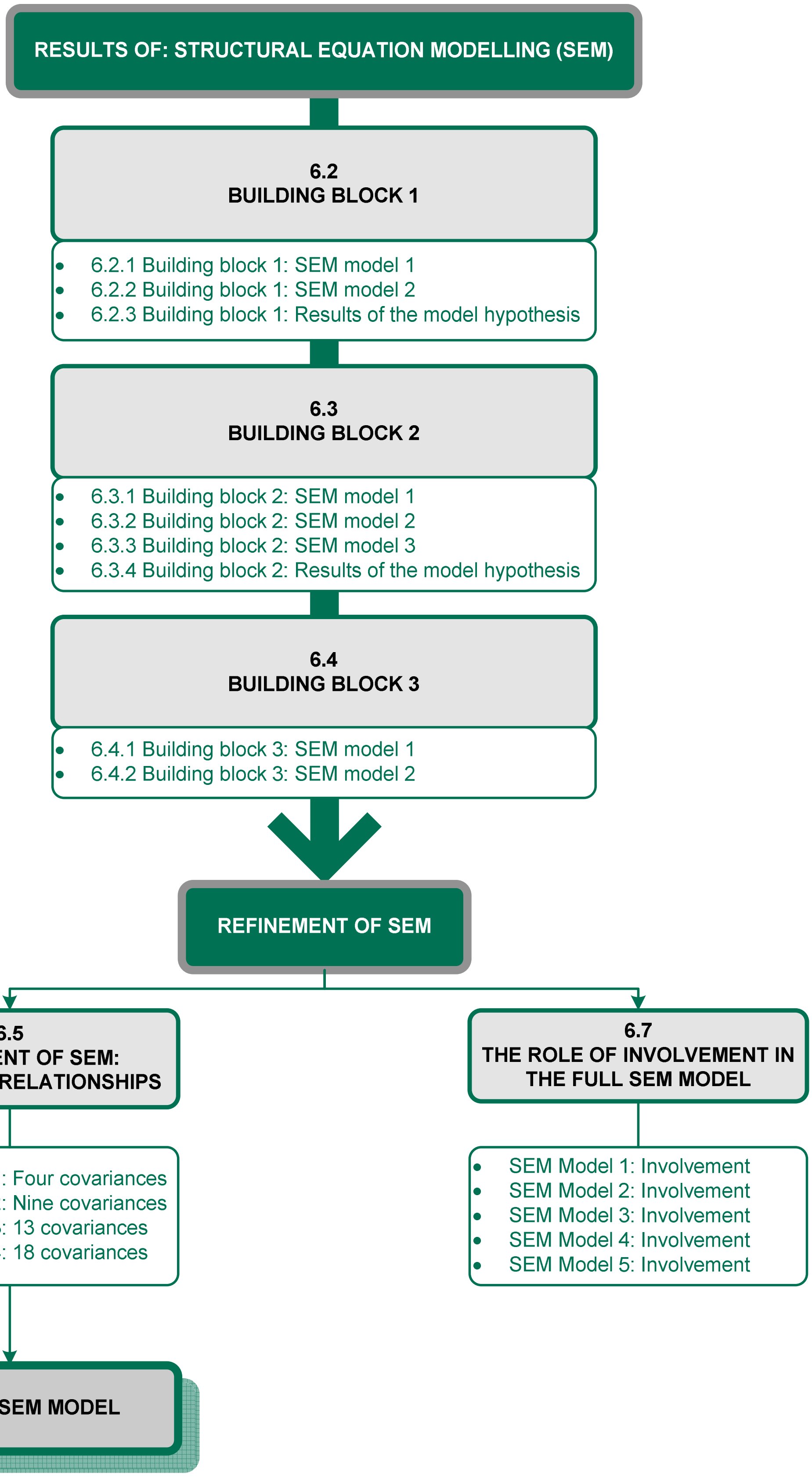

Figure 6.3: Structure and flow of SEM results

As indicated in Figure 6.3, the SEM results of the three building blocks of the conceptual framework for environmental and avitourism literacy (see Figure 6.2) are discussed in sections 6.2 to 6.4. The refinement of the SEM model is discussed in section 6.5, leading to the final SEM model which are presented in section 6.6. Finally, the results on the role that involvement played in the full SEM model are discussed in section 6.7. Building block 1, the relationship between avi-affinity, avi-awareness and environmental and avi-knowledge, is discussed next.

6.2 RESULTS OF SEM: BUILDING BLOCK 1: THE RELATIONSHIP BETWEEN AVI-ORIENTATION AND ENVIRONMENTAL AND AVI-KNOWLEDGE OF SECONDARY SCHOOL LEARNERS

SEM was employed to test the set of constructs and indicators in the measurement model, as well as the structural relationships among the constructs (Hair *et al*., 2010:675). In the first stages of SEM, the measurement model (assigning indicator variables to the constructs they should represent) was assessed (Hair *et al*., 2010:654). For this model, the measurement model included two constructs, namely 'avi orientation' and 'environmental and avi-knowledge'. The nine items used to measure the environmental orientation of secondary school learners towards birds and bird habitats were first subjected to CFA. The purpose of the CFA analysis was to evaluate whether the factors (eco-affinity and eco-awareness) suggested by Larson, Green and Castleberry (2011:79), could fit the data using CFA. The CFA model presented an unsatisfactory fit with the observed data, based on the goodness-of-fit indices, and therefore an EFA was conducted to determine the underlying factor structure of the data. Applying the EFA, two factors were identified to explain environmental orientation of learners towards birds and bird habitats and were labelled 'avi-affinity' and 'avi-awareness'. Both factors, demonstrated acceptable internal consistency as illustrated by the Cronbach's alpha coefficients (see section 5.4.1 for the CFA and EFA results).

In this section, first, the structural equation model including the first two constructs namely, avi-orientation (consisting of two latent constructs, avi-affinity and avi-awareness) and the environmental and avi-knowledge (a calculated observed variable/knowledge score) are presented (see section 6.2.1 Building block 1: SEM model 1). Secondly, based on the results of model 1 (model fit), modification indices were studied, and where theoretically justified, additional covariances between residual error terms were included in SEM model 2 (see section 6.2.2 Building block 1: Model 2). The results of the model hypothesis are presented in section 6.2.3 (see Figure 6.3).

6.2.1 Building block 1: SEM model 1

The visual portrayal of the SEM model consists of the measurement and structural model (Hair *et al*., 2010:638). The measurement and structural model, including the hypotheses for building block 1, are illustrated in Figure 6.4.

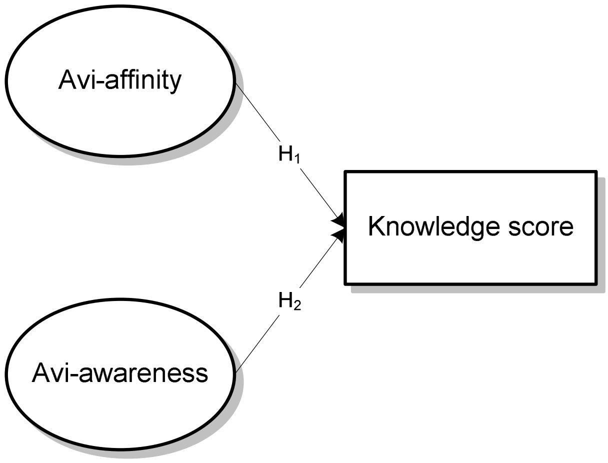

Figure 6.4: Building block 1: Hypothesised path diagram

The relationships in the model represent the research hypothesis set for building block 1. As such, Figure 6.5 illustrates the results of the SEM model incorporating both the measurement and structural relationships between avi-affinity, avi-awareness and environmental and avi-knowledge.

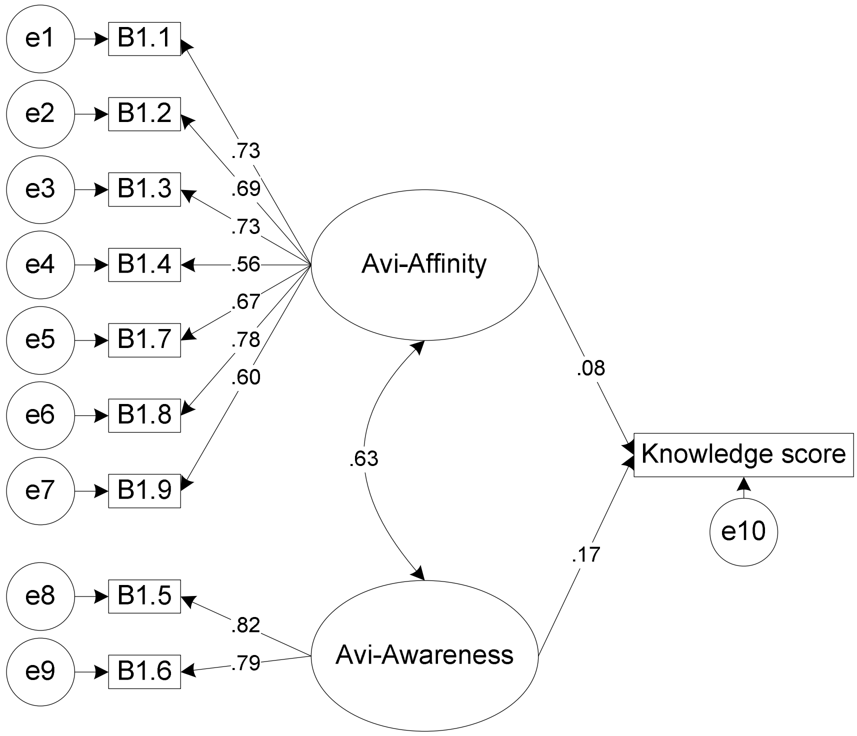

Figure 6.5: Building block 1: SEM model 1 as originally postulated with respect to avi-affinity, avi-awareness environmental and avi-knowledge

In Figure 6.5, the model presented avi-affinity and avi-awareness, the latent constructs dependent on its indicators, while knowledge represented an observed variable as a knowledge score was calculated.[54] Avi-affinity is represented by seven items (B1.1–B1.4 and B1.7–B1.9) and avi-awareness by two items (B1.5 and B1.6). In addition, e1–e9 represented the error terms associated with the observed variables.

A structural model involves specifying structural relationships between latent constructs (Hair *et al.*, 2010:638). These relationships (paths) in the model represent the research hypothesis that was set (see section 4.9.1 in the research methodology section). In Figure 6.5, a dependence relationship was indicated between avi-affinity and knowledge and between avi-awareness and knowledge. Furthermore, the figure depicts the covariance relationship that was specified between avi-affinity and avi-awareness.

[54] Calculation of knowledge score: The dichotomous data (correct versus incorrect answers) were converted into continuous data, as the sum of all the correct items for each individual learner, for the 10 questions, were calculated, and the corresponding percentage value was used as a continuous variable.

The model was then evaluated by goodness-of-fit indices to test whether the proposed model emulates the sample matrix (Hair *et al.*, 2014:579; Raykov & Marcoulides, 2000:36). Table 6.1 provides the goodness-of-fit indices of the structural model 1.

Table 6.1: Goodness-of-fit indices of building block 1: SEM model 1

Model	CMIN (X^2)	df	p	CMIN/df	RMSEA	CFI	TLI	IFI
Goodness-of-fit indices	20004.615	45	0.000	444.547	0.088	0.929	0.903	0.929
Indicate acceptable fit	-	-	-	<3	≤ 0.08	≥ 0.90	≥ 0.90	≥ 0.90

When the structural model was fitted to the data, the model did not fit the data well. Therefore, the RMSEA (0.088), with the lower and upper 90% confidence interval ranging between 0.085 and 0.092, indicated that the model fit was not adequate. The CFI (0.929), TLI (0.903) and IFI (0.929) were all above 0.90, which indicated an acceptable fit. The CMIN/df value of 444.547 was larger than 3, which also does not indicate an acceptable fit. However, when all these fit indices were considered, SEM model 1 presented an unsatisfactory fit with the observed data. Although the model did not show a satisfactory fit according to the set of indices, the structural parameter estimates are shown and discussed for comparative purposes.

Table 6.2 shows the structural parameter estimates, namely the unstandardised and standardised regression weights for the relationships between avi-affinity and knowledge as well as avi-awareness and knowledge.

Table 6.2: Structural parameter estimates: Building block 1 (SEM model 1)

			Un-standardised regression weights	S.E.	C.R.	P	Standardised regression weights
Knowledge	<---	Avi-affinity	1.815	0.482	3.768	***	0.077
Knowledge	<---	Avi-awareness	4.080	0.516	7.909	***	0.169

*** Significant at 0.1% level of significance (p-value < 0.001)

The relationships (paths) in the model shown in Table 6.2 represented the research hypothesis set. Considering the relationships of avi-affinity and avi-awareness with knowledge, both structural path estimates was statistically significant, in the expected direction and the estimated standardised regression coefficients were 0.08 and 0.17 respectively. The sizes of these coefficients indicated that avi-awareness had a positive, but weak effect on knowledge (0.17), whereas avi-affinity, although positive, had an even weaker effect on knowledge (0.08).

Since SEM model 1 presented an unsatisfactory fit with the observed data, a refinement of model 1 is discussed next.

6.2.2 Building block 1: SEM model 2

In order to improve on SEM model 1, modification indices were studied, and where theoretically justified (Hair *et al.*, 2014:559), additional covariances between residual error terms were included in SEM model 2.

Modification indices indicated that the residual error terms e1 and e2, and e4 and e7 were correlated and could improve model fit. The corresponding items were B1.1 ('I like to learn about different bird species') and B1.2 ('I like to read about birds'). Both items refer to gaining more knowledge about birds, as the items refer to reading and learning about birds and different bird species. The same argument could be followed for e4 and e7, which correspond to items B1.4 ('I would give some of my own money to help save birds') and B1.9 ('I would voluntarily clean parks in my neighbourhood to help birds'). As both items refer to people taking action to improve birdlife, the correlated errors are understandable. People might be willing to spend their money and time (e.g. by voluntary cleaning parks) on birds and the protection of birds. These relationships found potentially indicate that the construction of the 'environmental and avi-orientation' construct need to be reconsidered through future research.

Figure 6.6 shows the results of the structural model (SEM model 2) representing the relationships of learners' avi-affinity, avi-awareness and 'environmental and avi-knowledge'.

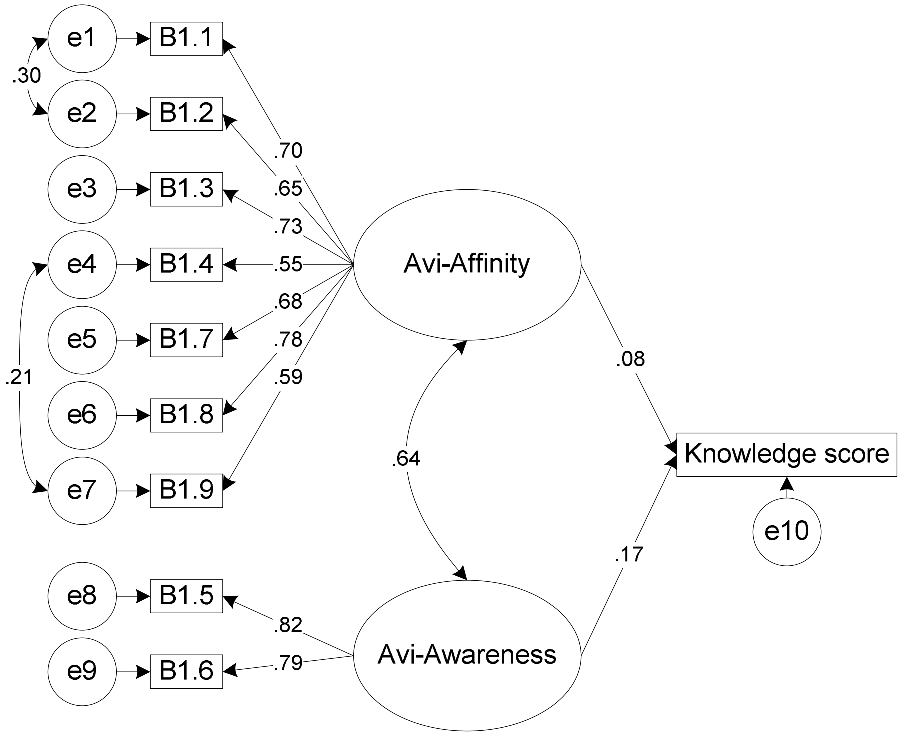

Figure 6.6: Building block 1: SEM model 2 with respect to avi-affinity, avi-awareness, and environmental and avi-knowledge

Figure 6.6 illustrates the additional covariances that were included between residual error terms in SEM model 2.

SEM model 2 was then evaluated by goodness-of-fit indices, which are depicted in Table 6.3.

Table 6.3: Goodness-of-fit indices of Building block 1: SEM model 2

Model	CMIN (X^2)	df	p	CMIN/df	RMSEA	CFI	TLI	IFI
Goodness of fit indices	812.956	31	0.000	26.224	0.068	0.961	0.943	0.961
Indicate acceptable fit	-	-	-	<3	≤ 0.08	≥ 0.90	≥ 0.90	≥ 0.90

When SEM model 2 was fitted to the data, the goodness-of-fit supported the structural model. The RMSEA (0.068), with the lower and upper 90% confidence interval ranging between 0.064 and 0.072, indicated acceptable model fit. The CFI (0.961), TLI (0.943) and IFI (0.961) were all larger than 0.90, which provided evidence that the model fitted the data. The CMIN/df value of 26,224 was larger than 3, not indicating an acceptable fit. SEM model 2 provides an improvement over SEM model 1 in representing the relationships between avi-affinity, avi-awareness and 'environmental and avi-knowledge' of secondary school learners as the model fitted the data. Therefore, the relationships indicated in SEM model 2 (Figure 6.6) was interpreted and also represented the research hypothesis that was set for building block 1 (see Table 4.13, the summary of the research hypothesis).

The unstandardised and standardised regression weights (structural parameter estimates) of SEM model 2 are presented in Table 6.4.

Table 6.4: Structural parameter estimates: SEM Building block 1 (SEM model 2)

			Un-standardised regression weights	S.E.	C.R.	P	Standardised regression weights
Knowledge	<---	Avi-affinity	2.007	0.519	3.868	***	0.082
Knowledge	<---	Avi-awareness	3.987	0.527	7.561	***	0.166

*** Significant at 0.1% level of significance (p-value < 0.001)

Considering the relationships of avi-affinity and avi-awareness with knowledge in Figure 6.6, both structural path estimates were statistically significant, in the expected direction and the estimated standardised regression coefficients were 0.08 and 0.17 respectively. The sizes of these coefficients indicated that avi-awareness had a positive, but weak effect on knowledge (0.17), whereas avi-affinity, although positive, had an even weaker effect on knowledge (0.08).

6.2.3 Building block 1: Results of the structural model hypothesis

Based on the results of SEM model 2 the hypotheses that were set for building block 1 were evaluated. Table 6.5 provides the results of the structural model hypotheses.

Table 6.5: Results of the structural model hypotheses: Building block 1 (SEM model 2)

Null hypotheses				Standardised regression weights	Outcome (null hypothesis)
H_{01}	Knowledge	<---	Avi-affinity	0.082	Rejected
H_{02}	Knowledge	<---	Avi-awareness	0.166	Rejected

Table 6.5 indicates that both the null hypotheses (H_{01} and H_{02}) were rejected.

- H_1: Avi-affinity is related to 'environmental and avi-knowledge'
- H_2: Avi-awareness is related to 'environmental and avi-knowledge'

Both hypotheses indicate that avi-affinity (β = 0.082) and avi-awareness (β = 0.166) had a weak, positive effect on knowledge.

In building block 2, the relationships between avi-affinity and avi-awareness, 'bird and environmental knowledge' and 'environmental and avi-values' are discussed next.

6.3 RESULTS OF SEM: BUILDING BLOCK 2: THE RELATIONSHIPS BETWEEN AVI-ORIENTATION, ENVIRONMENTAL AND AVI-KNOWLEDGE AND ENVIRONMENTAL AND AVI-VALUES OF SECONDARY SCHOOL LEARNERS

In the second building block, environmental and avi-values were added to building block 1. Thus, in building block 2, the measurement model included two latent constructs, namely avi-orientation and environmental and avi-values, and one calculated observed variable, environmental and avi-knowledge (see Figure 6.2).

As explained in the previous section (section 6.2.1), avi-orientation consisted of two latent sub-constructs, namely avi-affinity and avi-awareness, while environmental and avi-knowledge is a calculated observed variable as the knowledge score was calculated based on the number of correctly answered questions[55] in Section C of the questionnaire (see Appendix A).

The latent construct added in building block 2, environmental and avi-values of secondary school learners towards birds and bird habitats, measured by 20 items, was first subjected to CFA. The CFA analysis was employed to evaluate whether the sub-constructs (utilisation and preservation) representing general environmental values, as suggested by Bogner and Wiseman (2006:253), could fit the data of the current study, focusing on environmental and avi-values (section 4.4, construction of questionnaire). The CFA model presented an unsatisfactory fit with the observed data, based on the goodness-of-fit indices, and therefore an EFA was conducted to determine the underlying factor structure of the data. Applying the EFA, four factors were identified to explain environmental and avi-values of learners towards birds and bird habitats and were labelled (1) pro-environmental values, (2) utilisation, (3) enjoyment and (4) critical

[55] Calculation of knowledge score: The dichotomous data (correct versus incorrect answers) were converted into continuous data, as the sum of all the correct items for each individual learner, for the 10 questions, was calculated and the corresponding percentage value was used as a continuous variable.

resources. All four factors, demonstrated acceptable internal consistency as illustrated by the Cronbach's alpha coefficients (see section 5.4.2 for the CFA and EFA results).

In this section, first, the strength and direction (positive or negative) of the relationships between avi-orientation; environmental and avi-knowledge and environmental and avi-values were determined (see section 6.3.1 Building block 2: SEM model 1). Secondly, the environmental and avi-knowledge variable was removed from the model to determine the direct relationship value between 'avi-orientation' and 'environmental and avi-values' (see section 6.3.2 Building block 2: SEM model 2). Lastly, based on the results (model fit) of the first two models, the potential role of knowledge as a moderator in the relationship between avi-orientation, and *environmental and avi-values* was further explored (see section 6.3.3 Building block 2: SEM model 3). The results of the model hypothesis are presented in section 6.3.4 (see Figure 6.3).

6.3.1 Building Block 2: SEM model 1

In SEM model 1, the strength and direction (positive or negative) of the relationships between avi-orientation, environmental and avi-knowledge, and environmental and avi-values were determined. The measurement and the structural model, including the hypothesis for building block 2, are illustrated in Figure 6.7.

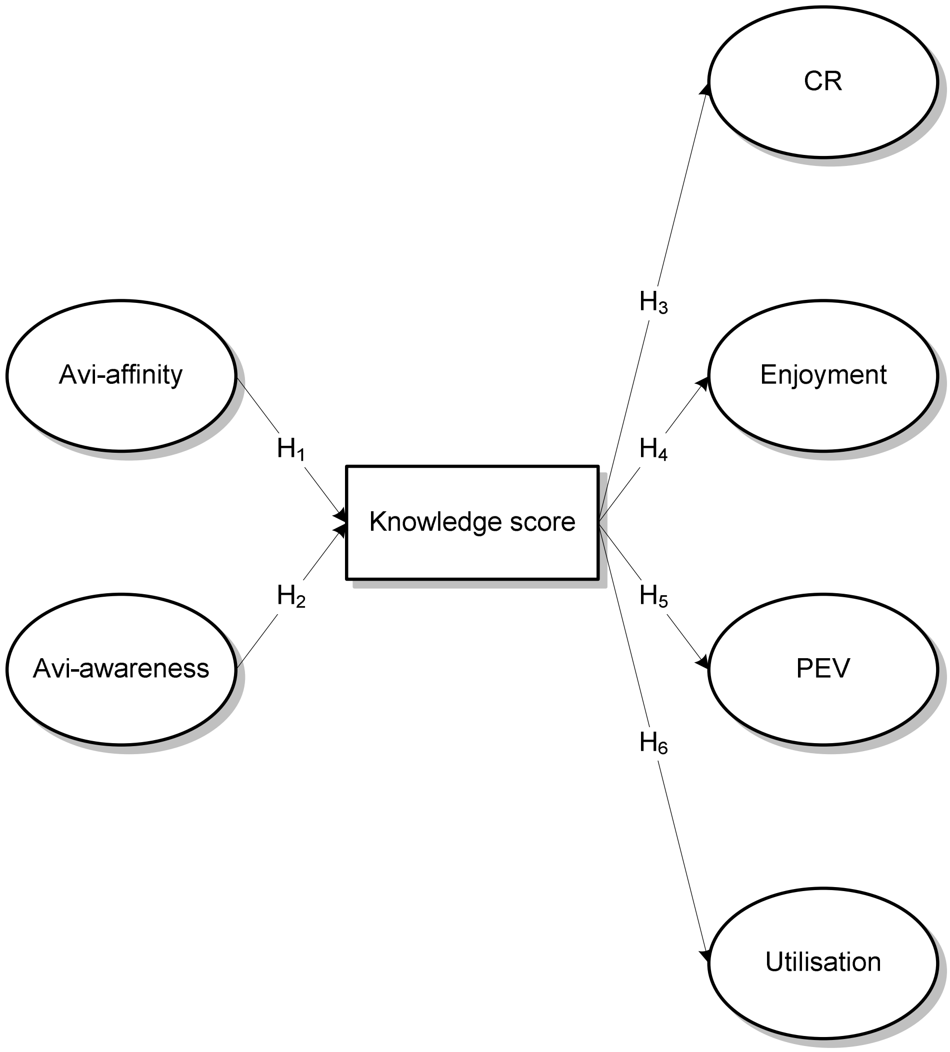

Figure 6.7: Building block 2 (SEM model 1): Hypothesised path diagram

The relationships in the model represent the research hypothesis set. Figure 6.8 illustrates the results of a SEM model incorporating both the measurement and structural relationships of avi-orientation (avi-affinity and avi-awareness), environmental and avi-knowledge, and environmental and avi-values (pro-environmental values, utilisation, enjoyment and critical resources).

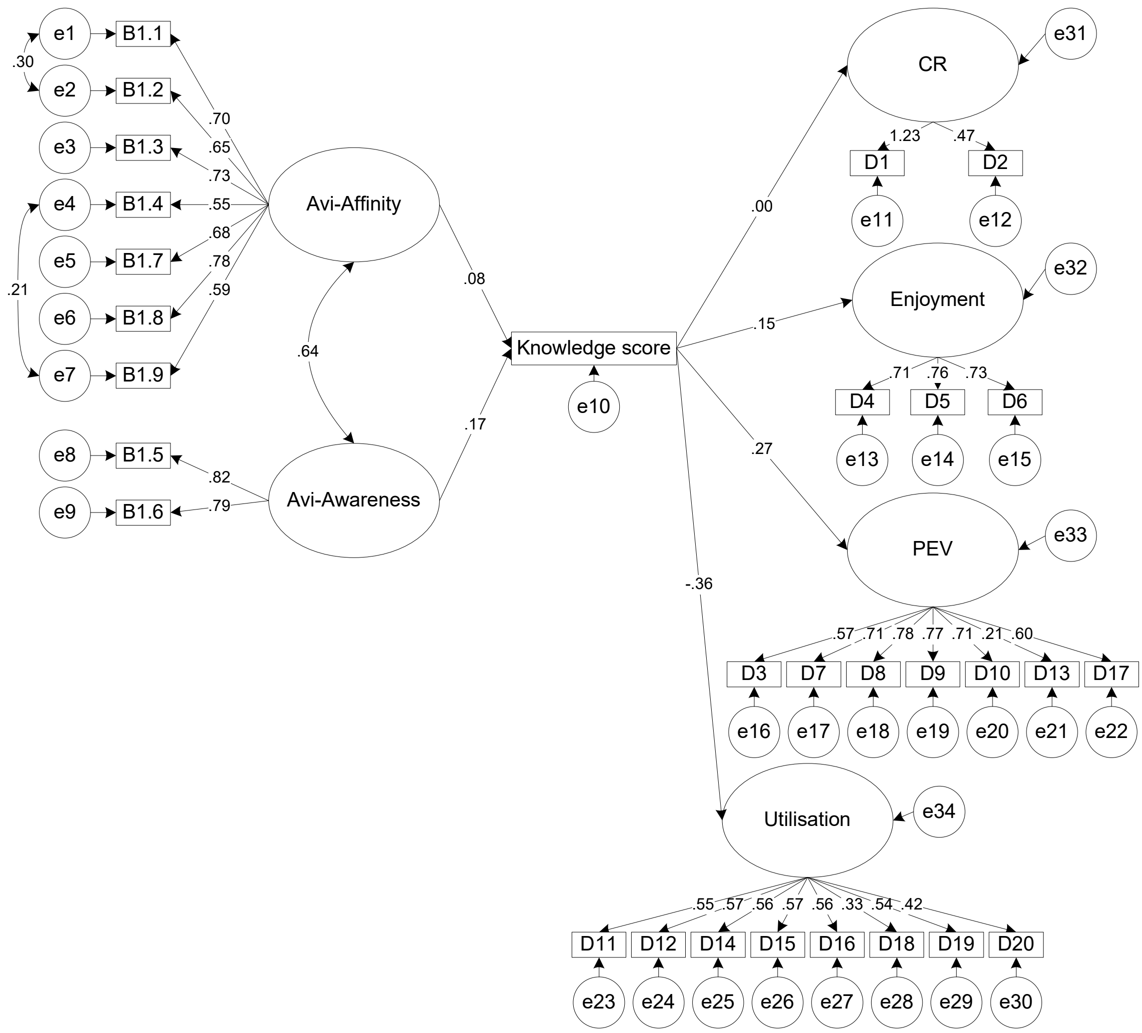

Figure 6.8: Building block 2 (SEM model 1): The SEM model as originally postulated with respect to avi-affinity, avi-awareness, knowledge and avi-values

The model parameters as indicated in Figure 6.8, were initially presented using the unobserved (latent), exogenous constructs, avi-affinity and avi-awareness, the observed, endogenous observed variable, knowledge, and the unobserved, endogenous constructs, critical resources, enjoyment, pro-environmental values and utilisation. Avi-affinity is represented by seven indicators (items) (B1.1, B1.2, B1.3, B1.4, B1.7, B1.8, B1.9), avi-awareness by two items (B1.5, B1.6), critical resources by two items (D1, D2), enjoyment by three items (D4, D5, D6), pro-environmental values by seven items (D3, D7, D8, D9, D10, D13, D17) while utilisation was represented by eight items (D11, D12, D14, D15, D16, D18, D19, D20). Furthermore, e1–e34 represent the residual error terms associated with the variables.

In Figure 6.8, a dependence relationship was indicated between avi-affinity and knowledge, avi-awareness and knowledge, knowledge and critical resources, knowledge and enjoyment, knowledge and pro-environmental values and between knowledge and utilisation. Similar to the model from building block 1, this model in Figure 6.8 also depicts the covariance relationship that was specified between avi-affinity and avi-awareness.

Table 6.6 provides the goodness-of-fit indices of building block 2 (SEM model 1) with covariances.

Table 6.6: Goodness-of-fit indices: Building block 2 (SEM model 1) with additional covariances

Model	CMIN (X^2)	df	p	CMIN/df	RMSEA	CFI	TLI	IFI
Goodness-of-fit indices	13199.641	398	0.000	33.165	0.077	0.778	0.757	0.778
Indicate acceptable fit	-	-	-	<3	≤ 0.08	≥ 0.90	≥ 0.90	≥ 0.90

The model did not show an adequate fit. The RMSEA (0.077), with the lower and upper 90% confidence interval ranging between 0.075 and 0.078, indicated acceptable model fit. The CFI (0.778), TLI (0.757) and IFI (0.778) were below 0.90, which did not indicate an acceptable fit. The CMIN/df value of 33,165 was larger than 3, which did not indicate an acceptable fit. Therefore, when all these fit indices were considered, Building block 2 (SEM model 1) presented an unsatisfactory fit with the observed data. Although the model did not show a satisfactory fit, the structural parameter estimates are shown and discussed for comparative purposes.

Table 6.7 indicates the structural parameter estimates, namely the unstandardised and standardised regression weights for the relationships for building block 2, SEM model 1.

Table 6.7: Structural parameter estimates: Building block 2 (SEM model 1)

Relationships			Un-standardised regression weights	S.E.	C.R.	P	Standardised regression weights
Knowledge	<---	Avi-affinity	2.007	0.519	3.868	***	0.082
Knowledge	<---	Avi-awareness	3,987	0.527	7.561	***	0.166
Critical resources	<---	Knowledge	0.000	0.001	0.036	0.971	0.000
Enjoyment	<---	Knowledge	0.007	0.001	9.696	***	0.149
PEV	<---	Knowledge	0.009	0.000	17.497	***	0.265
Utilisation	<---	Knowledge	-0.013	0.001	-21.226	***	-0.358

*** Significant at 0.1% level of significance (p-value < 0.001)

Considering the relationships of avi-affinity and avi-awareness with knowledge, both structural path estimates were statistically significant, and the estimated standardised regression coefficients were 0.08 and 0.17 respectively. The sizes of these coefficients indicated that avi-awareness had a positive, but weak effect on knowledge (0.17), whereas avi-affinity, although positive, an even weaker effect on knowledge (0.08). With regard to the relationships between knowledge and enjoyment, pro-environmental values and utilisation, the structural path estimates were statistically significant and the estimated standardised regression coefficients were 0.15, 0.27 and -0.36 respectively. The sizes of these coefficients indicate that knowledge has a positive, but weak effect on enjoyment (0.15), knowledge has a positive, but slightly stronger effect on pro-environmental values (0.27), whereas knowledge has a negative, moderate effect on utilisation (-0.36). However, the relationship between knowledge and critical resources was not statistically significant and was equal to zero.

In general, the results of SEM model 1 indicated that the relationships between avi-orientation (avi-affinity and avi-awareness) and environmental and avi-knowledge, as well as the relationship between knowledge and 'environmental and avi-values' was not strong. Therefore, in order to investigate the direct relationships between avi-orientation and environmental and avi-values in the following model, the observed knowledge variable was removed from SEM model 2 and is discussed next.

6.3.2 Building Block 2: SEM model 2

The measurement and structural model, including the hypothesis for building block 2, SEM model 2, is illustrated in Figure 6.9.

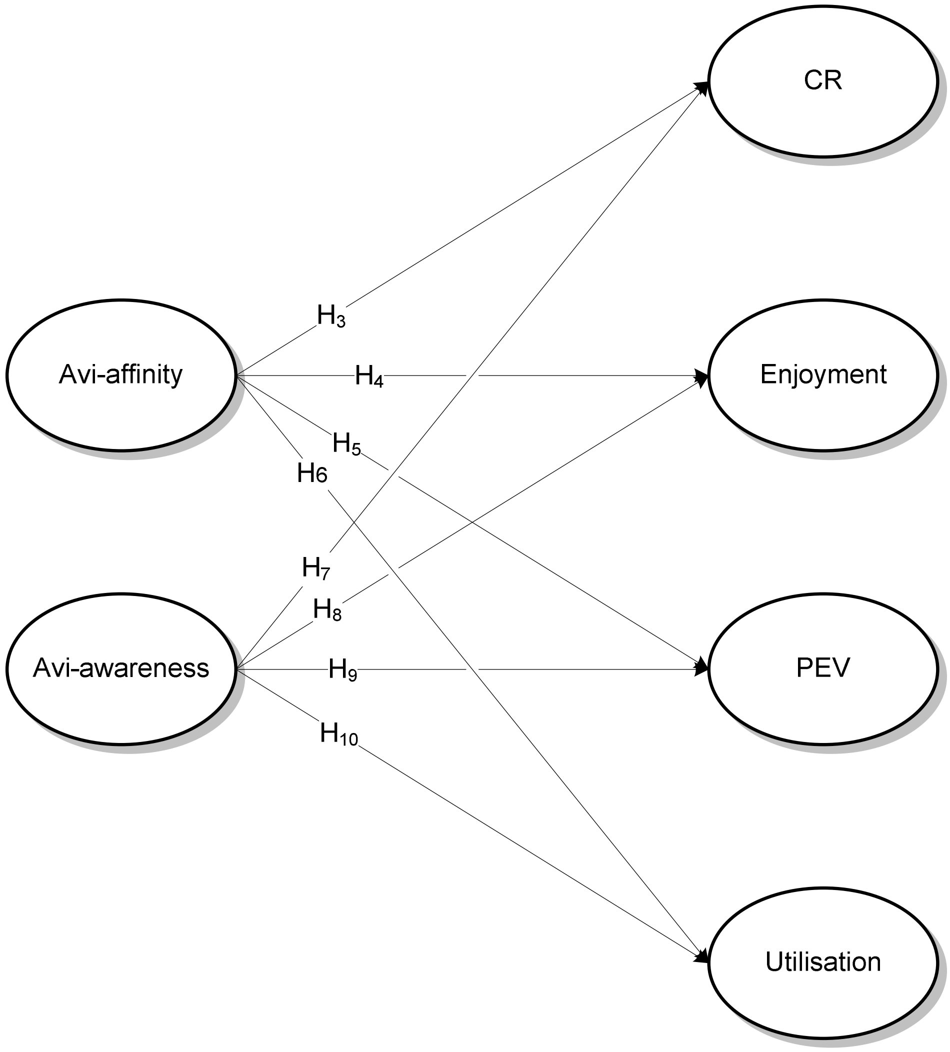

Figure 6.9: Building block 2 (SEM model 2): Hypothesised path diagram

In SEM model 2, indicated in Figure 6.9, the structural model represented the relationships of learners' avi-orientation (avi-affinity and avi-awareness) and environmental and avi-values (critical resources, enjoyment, pro-environmental values and utilisation).

The results of the structural model analysis are shown in Figure 6.10.

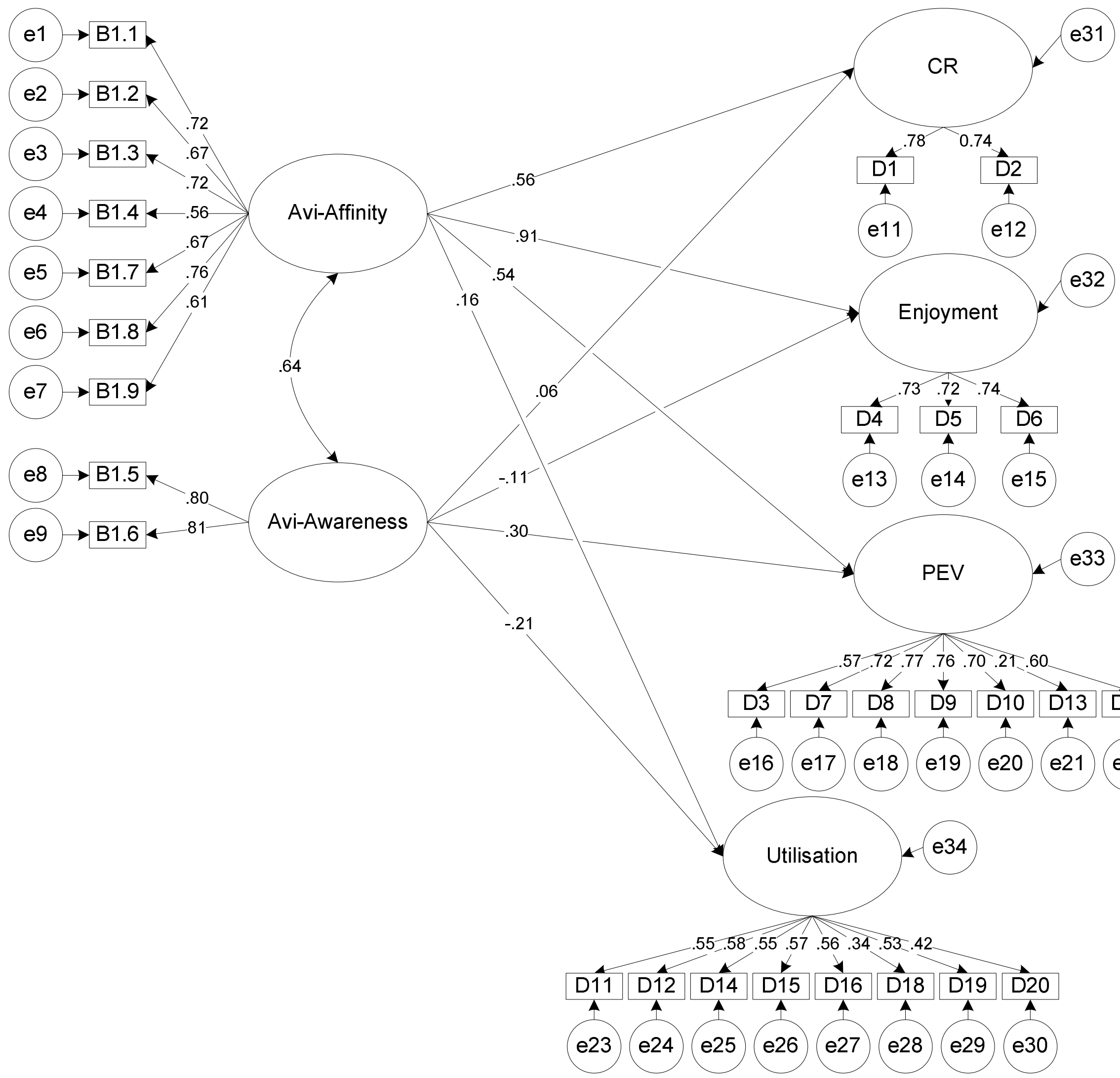

Figure 6.10: Building block 2 (SEM model 2): Relationships between avi-affinity, avi-awareness and environmental and avi-values

In SEM model 2, the model parameters as indicated in Figure 6.10, were specified as the unobserved (latent), exogenous constructs, avi-affinity and avi-awareness, and the unobserved, endogenous constructs, critical resources, enjoyment, pro-environmental values and utilisation.

Similar to SEM model 1 –

- the avi-affinity construct was measured by seven manifest variables (B1.1, B1.2, B1.3, B1.4, B1.7, B1.8, B1.9),
- avi-awareness by two items (B1.5 and B1.6),
- critical resources by two items (D1, D2),
- enjoyment by three items (D4, D5, D6),

- pro-environmental values by seven items (D3, D7, D8, D9, D10, D13, D17) while
- utilisation was measured by eight items (D11, D12, D14, D15, D16, D18, D19, D20) (see Annexure A: Questionnaire, Section B1 and Section D for variables labels).
- Also, e1–e34 represent the residual error terms associated with the variables.

In Figure 6.10 the structural model indicated a dependence relationship between avi-affinity and critical resources, enjoyment, pro-environmental values and utilisation, as well as between avi-awareness and critical resources, enjoyment, pro-environmental values and utilisation. Figure 6.10 also depicts the covariance relationship that was specified between avi-affinity and avi-awareness.

SEM Model 2 was then evaluated by goodness-of-fit indices, which are depicted in Table 6.8.

Table 6.8: Goodness-of-fit indices: Building block 2 (SEM model 2)

Model	CMIN (X^2)	df	p	CMIN/df	RMSEA	CFI	TLI	IFI
Goodness of fit indices	6148.183	368	0.000	16.707	0.054	0.898	0.887	0.898
Indicate acceptable fit	-	-	-	<3	≤ 0.08	≥ 0.90	≥ 0.90	≥ 0.90

When the structural model was fitted to the data, the SEM model 2 showed an improved model fit, compared to SEM model 1, but not an adequate fit. The RMSEA (0.054) indicated that the model fit adequately. However, the CFI (0.898), TLI (0.887) and IFI (0.898) were very close to, but slightly below 0.90 which did not indicate an acceptable fit. The CMIN/df value of 16,707 was larger than 3, which does not indicate an acceptable fit. Although the model did not show a satisfactory fit, the structural parameter estimates are shown and discussed for comparative purposes.

The unstandardised and standardised regression weights (structural parameter estimates) of SEM model 2 are presented in Table 6.9.

Table 6.9: Structural parameter estimates: Building block 2 (SEM model 2)

Relationships			Un-standardised regression weights	S.E.	C.R.	P	Standardised regression weights
Critical resources	<---	Avi-affinity	0.622	0.026	23.829	***	0.562
Enjoyment	<---	Avi-affinity	1,039	0.028	37.502	***	0.911
PEV	<---	Avi-affinity	0.431	0.017	25.750	***	0.543
Utilisation	<---	Avi-affinity	0.141	0.021	6.584	***	0.159
Critical resources	<---	Avi-awareness	0.070	0.024	2.873	0.004**	0.064
Enjoyment	<---	Avi-awareness	-0.122	0.021	-5.780	***	-0.109
PEV	<---	Avi-awareness	0.233	0.015	15.837	***	0.299
Utilisation	<---	Avi-awareness	-0.180	0.022	-8.071	***	-0.206

*** Significant at 0.1% level of significance (p-value < 0.001)

** Significant at 1% level of significance (p-value < 0.01)

Considering the relationships of avi-affinity with critical resources, enjoyment; pro-environmental values and utilisation, the structural path estimates were statistically significant, and the estimated standardised regression coefficients were 0.56, 0.91, 0.54 and 0.16 respectively. The sizes of these coefficients indicated that avi-affinity had the strongest relationship with enjoyment (0.91), followed by critical resources (0.56), pro-environmental values (0.54) and a weak effect on utilisation (0.16).

The relationships between of avi-awareness and critical resources, enjoyment, pro-environmental values and utilisation, the structural path estimates were statistically significant, and the estimated standardised regression coefficients were 0.06, -0.11, 0.30 and -0.21 respectively. The sizes of these coefficients indicated that avi-awareness had a positive, very weak effect on critical resources (0.06), a negative, but weak effect on enjoyment (-0.11), a positive, moderate effect on pro-environmental values (0.30), whereas avi-awareness had a negative, weak effect on utilisation (-0.21).

Although SEM Model 2 did not fit the data adequately the objective of Model 2 was to determine the relationships between avi-orientation (avi-affinity and avi-awareness) and environmental and avi-values (critical resources, enjoyment, pro-environmental values and utilisation) without considering the relationships between avi-orientation and knowledge and between knowledge and environmental and avi-values. The results indicated that a relationship exists between avi-affinity and avi-values (critical resources, enjoyment, pro-environmental values and utilisation) as well as between and avi-awareness and avi-values (critical resources, enjoyment, pro-environmental values and utilisation).

In order to investigate and improve the structural model for building block 2 further, it was considered whether the knowledge variable could possibly be a moderator[56] between the two related constructs (avi-orientation and environmental and avi-values). That is, the relationship between the two related constructs changes based on the level amount of a moderator (Hair *et al*., 2010:690). Based on the work of Meinhold and Malkus (2005:523) and Alp *et al*. (2006:210) the role of knowledge as a possible moderating relationship was investigated. Their findings indicated that adolescents, who demonstrated more pro-environmental attitudes and greater environmental knowledge, will report more pro-environmental behaviours (Alp *et al*., 2006:210; Meinhold & Malkus, 2005:523). Furthermore, Meinhold and Malkus (2005:524) illustrated that the relationship between environmental attitudes and behaviour was noticeably stronger in high-knowledge groups compared to low-knowledge groups (Meinhold & Malkus, 2005:524). Thus, in the following model, model 3, the moderating effect of knowledge was tested in the relationship between avi-orientation and environmental and avi-values.

6.3.3 Building block 2: SEM model 3

In the previous section, the results of SEM Model 2 suggested that a relationship existed between avi-orientation and environmental and avi-values. In this section, the potential role of knowledge as a moderator in the relationship between avi-orientation and environmental and avi-values was considered. Since the observed knowledge variable was a continuous, metric variable, it was evaluated using SEM (Hair *et al.*, 2010:771). The metric moderator (knowledge) was modelled by creating interaction terms, similar to when using a regression approach (Hair *et al.*, 2010:771). The interaction terms were calculated by multiplying the standardised knowledge values

[56] Moderator effect: "The effect of a third variable or construct changing the relationship between two related variables or constructs" (Hair *et al*., 2010:690). That is, the relationship between two constructs changes based on the level or amount of a moderator.

with the standardised avi-affinity and avi-awareness values (Hair *et al.*, 2010:771). Figure 6.11 shows a structural model including the moderating effect of knowledge between the relationships of learners' avi-orientation (avi-affinity and avi-awareness) and environmental and avi-values (critical resources, enjoyment, pro-environmental values and utilisation).

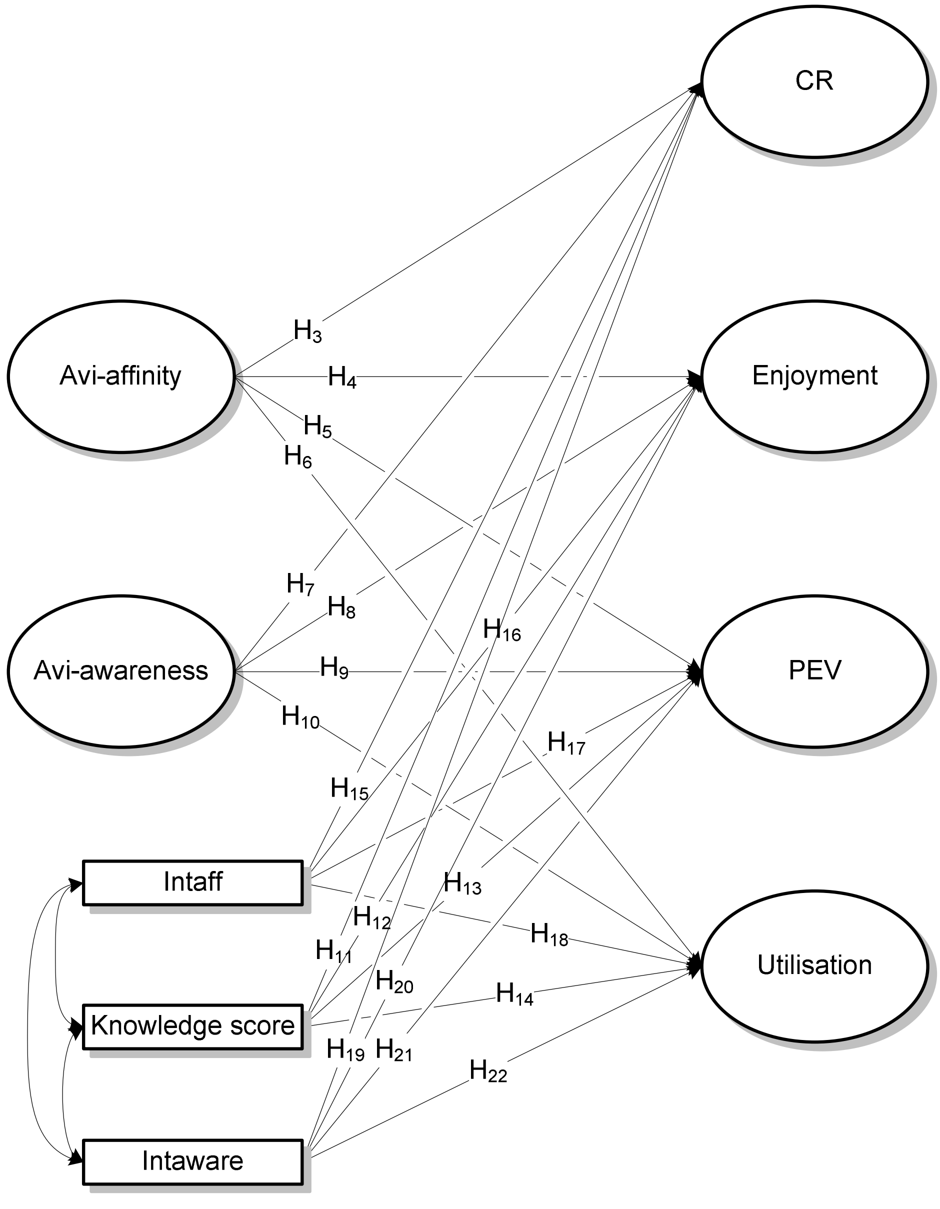

Figure 6.11: Building block 2 (SEM model 3): Hypothesised path diagram

The results of the structural model are presented in Figure 6.12.

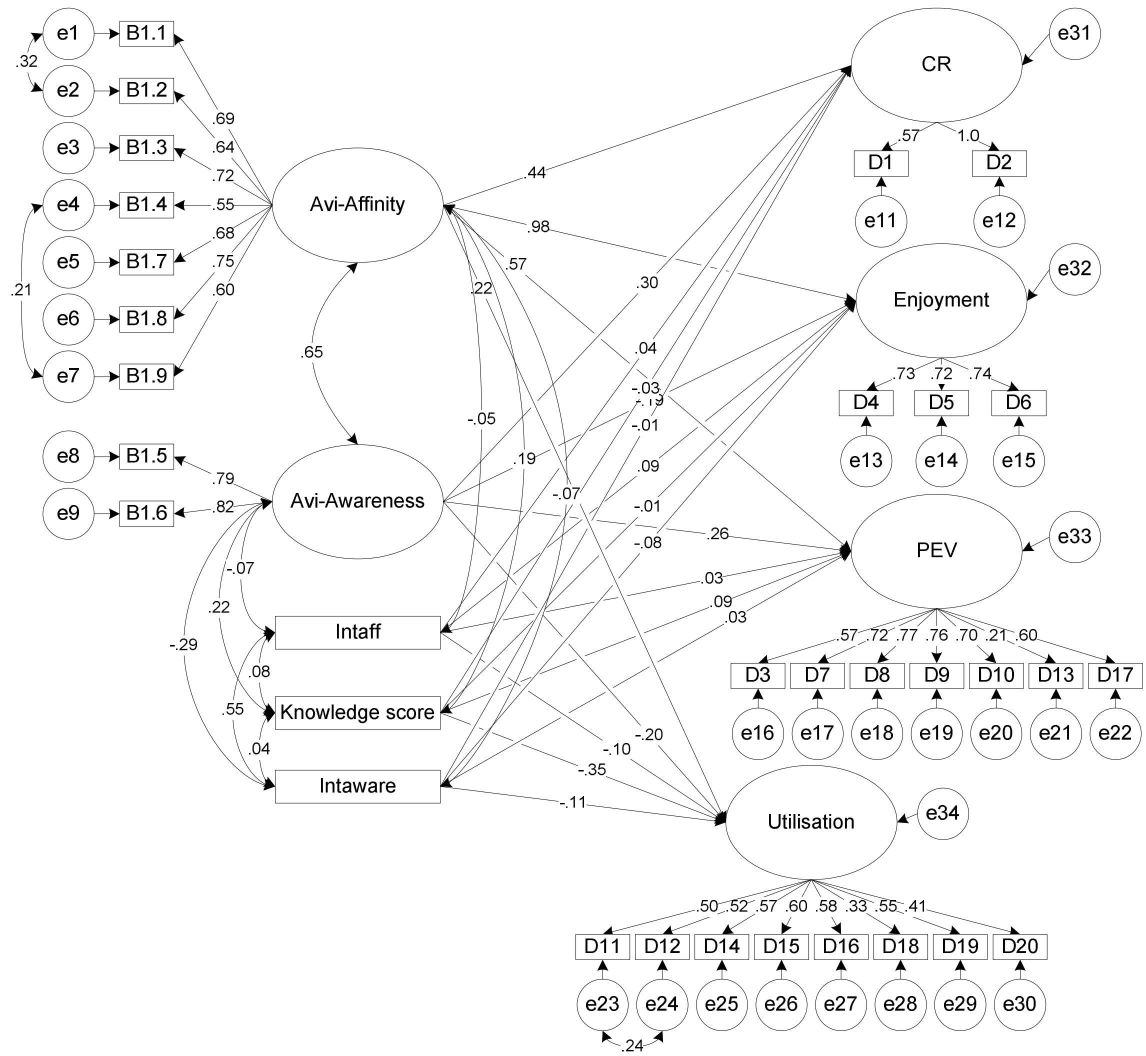

Figure 6.12: Building block 2 (SEM model 3): The moderating effect of knowledge in the relationships between avi-affinity, avi-awareness and avi-values

In SEM Model 3, the model parameters as indicated in Figure 6.12, were specified as the unobserved (latent), exogenous constructs, avi-affinity and avi-awareness; the observed, exogenous variable knowledge, the exogenous interaction variables avi-affinity (intaff) and avi-awareness (intaware); and the unobserved, endogenous constructs, critical resources, enjoyment, pro-environmental values and utilisation.

The avi-affinity construct was measured by seven manifest variables (B1.1, B1.2, B1.3, B1.4, B1.7, B1.8, B1.9), avi-awareness by two items (B1.5 and B1.6), critical resources by two items (D1, D2), enjoyment by three items (D4, D5, D6), pro-environmental values by seven items (D3, D7, D8, D9, D10, D13, D17) while utilisation was measured by eight items (D11, D12, D14, D15, D16, D18, D19, D20) (see Annexure A:

Questionnaire, Section B1 and Section D for variables labels). Also, e1–e34 represent the error terms associated with the variables.

Figure 6.12 also illustrates the dependence relationships were indicated by means of one-headed arrows while covariance relationships were indicated by two-headed arrows.

Additional covariances between residual error terms were thus included in the model. Modification indices showed that the measurements e23 and e24 were correlated. The corresponding items were D11 ('Humans have the right to change natural bird habitats as they see fit') and D12 ('We need to clear bird habitats in order to grow crops'). As both items refer to people's right to change or clear bird habitats, the correlated errors are understandable. The relationship found potentially indicate that the construction of the environmental and avi-values construct need to be reconsidered through future research.

SEM Model 3, with additional covariances, was evaluated by goodness-of-fit indices, which are depicted in Table 6.10.

Table 6.10: Goodness-of-fit indices: Building block 2 (SEM model 3) with additional covariances

Model	CMIN (X^2)	df	p	CMIN/df	RMSEA	CFI	TLI	IFI
Goodness of fit indices	5877.216	435	0.000	13.511	0.048	0.910	0.897	0.910
Indicate acceptable fit	-	-	-	<3	≤ 0.08	≥ 0.90	≥ 0.90	≥ 0.90

When the SEM model was fitted to the data, the goodness-of-fit indices supported the structural model. The RMSEA (0.048) indicated that the model fit well. The CFI (0.910) and IFI (0.910) were all larger than 0.90, which provided further evidence that the model fitted the data. The CMIN/df value of 13.511 was larger than 3, which does not indicate an acceptable fit. SEM Model 3 provides an improvement over SEM Models 1 and 2 in representing the relationships between avi-affinity, avi-awareness, knowledge, and environmental and avi-values of secondary school learners as the SEM model fitted the data.

The structural parameter estimates of SEM model 3 are presented in Table 6.11.

Table 6.11: Structural parameter estimates: Building block 2 (SEM Model 3)

Relationships			Un-standardised regression weights	S.E.	C.R.	P	Standardised regression weights
Critical resources	<---	Avi-affinity	0.375	0.019	19.395	***	0.440
Enjoyment	<---	Avi-affinity	1.162	0.032	35.946	***	0.977
PEV	<---	Avi-affinity	0.470	0.019	25.363	***	0.569
Utilisation	<---	Avi-affinity	0.180	0.021	8.719	***	0.218
Critical resources	<---	Avi-awareness	0.027	0.018	1.516	0.129	0.034
Enjoyment	<---	Avi-awareness	-0.209	0.025	-8.425	***	-0.189
PEV	<---	Avi-awareness	0.197	0.016	12.373	***	0.255
Utilisation	<---	Avi-awareness	-0.151	0.021	-7.100	***	-0.196
Critical resources	<---	Knowledge	-0.001	0.000	-2.309	0.021**	-0.030
Enjoyment	<---	Knowledge	0.000	0.001	-0.471	0.638	-0.006
PEV	<---	Knowledge	0.003	0.000	8.257	***	0.094
Utilisation	<---	Knowledge	-0.012	0.001	-19.398	***	-0.349
Critical resources	<---	intaff	0.022	0.010	2.301	0.021**	0.035
Enjoyment	<---	intaff	0.083	0.013	6.530	***	0.093
PEV	<---	intaff	0.016	0.008	2.017	0.044**	0.027
Utilisation	<---	intaff	-0.059	0.011	-5.199	***	-0.095
Critical resources	<---	intaware	-0.003	0.011	-0.298	0.766	-0.005
Enjoyment	<---	intaware	-0.071	0.014	-5.011	***	-0.078
PEV	<---	intaware	0.018	0.009	1.947	0.051	0.028
Utilisation	<---	intaware	-0.067	0.013	-5.304	***	-0.106

*** Significant at 0.1% level of significance (p-value < 0.001)

** Significant at 1% level of significance (p-value < 0.01)

Considering the relationships of avi-affinity with critical resources, enjoyment, pro-environmental values and utilisation, the structural path estimates were statistically significant, and the estimated standardised regression coefficients were all positive with values of 0.44, 0.98, 0.57 and 0.22 respectively. The sizes of these coefficients indicated that avi-affinity had the strongest positive relationship with enjoyment (0.98), followed by pro-environmental values (0.57), critical resources (0.44) and a weak effect on utilisation (0.22).

The relationship between avi-awareness and critical resources was not statistically significant, while with regard to the relationships between of avi-awareness and enjoyment, pro-environmental values and utilisation, the structural path estimates were statistically significant, and the estimated standardised regression coefficients were -

0.19, 0.26 and -0.20 respectively. The sizes and direction of these coefficients indicated that avi-awareness has a negative, weak effect on enjoyment (-0.19), a positive, weak effect on pro-environmental values (0.26), whereas avi-awareness has a negative, weak impact on utilisation (-0.20).

The relationship between knowledge and enjoyment was not statistically significant, while regarding the effect of knowledge on critical resources, pro-environmental values and utilisation, the structural path estimates were statistically significant, and the estimated standardised regression coefficients were -0.03, 0.09 and -0.35 respectively. The sizes and direction of these coefficients indicated that knowledge had a negative, very weak effect on critical resources, a positive, very weak effect on pro-environmental values (0.09), while knowledge had a negative, moderate impact on utilisation (-0.35).

Considering the interaction effect between knowledge and avi-affinity with critical resources, enjoyment, pro-environmental values and utilisation, the structural path estimates were statistically significant, and the estimated standardised regression coefficients were 0.04, 0.09, 0.03 and -0.10 respectively. The interaction effect between avi-affinity and knowledge had a positive, very weak effect on critical resources (0.04), enjoyment (0.09) and pro-environmental values (0.03), whereas this interaction effect, had a negative, weak effect on utilisation (-0.10). The results thus indicated that the interaction effect between knowledge and avi-affinity had an effect, but a very weak one, on environmental and avi-values.

Regarding the interaction effect between knowledge and avi-awareness with critical resources, enjoyment; pro-environmental values and utilisation, the structural path estimates between ‘intaware’ and enjoyment and ‘intaware’ and utilisation was statistically significant, and the estimated standardised regression coefficients were -0.08 and -0.11 respectively. The sizes of these coefficients indicated that ‘intaware’ has a negative, but very weak effect on enjoyment (-0.08) and utilisation (-0.11) respectively. The results thus indicated that the interaction effect between knowledge and avi-awareness had a very weak effect on enjoyment and utilisation.

Therefore, the relationships indicated in SEM Model 3 (Figure 6.12) were interpreted and also represented the research hypothesis that was set for building block 2 (see Table 4.14).

6.3.4 Building Block 2: Results of the structural model hypothesis

Based on the outcome of SEM Model 3, the hypotheses that were set, as outlined in Table 6.13, were evaluated. When the relationship was statistically significant, the null hypothesis was rejected (Saunders *et al.*, 2016:537). Table 6.12 provides the results of the structural model hypotheses (H_3–H_{14}) while Table 6.13 depicts the outcome of the hypotheses regarding the moderating effect of environmental and avi-knowledge in SEM Model 3 (H_{15}–H_{22}).

Table 6.12: Results of the structural model hypotheses (H_3–H_{14}): Building block 2 (SEM Model 3)

Hypotheses				Standardised regression weights	Outcome Null hypothesis
H_{03}	Critical resources	<---	Avi-affinity	0.440	Rejected
H_{04}	Enjoyment	<---	Avi-affinity	0.977	Rejected
H_{05}	PEV	<---	Avi-affinity	0.569	Rejected
H_{06}	Utilisation	<---	Avi-affinity	0.218	Rejected
H_{07}	Critical resources	<---	Avi-awareness	(not sig)	Not rejected
H_{08}	Enjoyment	<---	Avi-awareness	-0.189	Rejected
H_{09}	PEV	<---	Avi-awareness	0.255	Rejected
H_{010}	Utilisation	<---	Avi-awareness	-0.196	Rejected
H_{011}	Critical resources	<---	Knowledge	-0.030	Rejected
H_{012}	Enjoyment	<---	Knowledge	(not sig)	Not rejected
H_{013}	PEV	<---	Knowledge	0.094	Rejected
H_{014}	Utilisation	<---	Knowledge	-0.349	Rejected

The results reported in Table 6.12 provide the outcome of the null-hypothesis for Building block 2 (SEM Model 3). The main findings regarding structural model hypotheses of building block 2 are summarised below.

- The relationship of *avi-affinity* with critical resources, enjoyment, pro-environmental values and utilisation, as represented by the structural path estimates was statistically significant. The null hypotheses regarding the relationships between 'avi-affinity' and 'environmental and avi-values' (H_{03}–H_{06}) were consequently rejected.

- H_3: Avi-affinity is related to critical resources
- H_4: Avi-affinity is related to enjoyment
- H_5: Avi-affinity is related to pro-environmental values
- H_6: Avi-affinity is related to utilisation

- The relationship of avi-awareness with enjoyment, pro-environmental values and utilisation, as represented by the structural path estimates was statistically significant. The null hypotheses regarding the relationships between 'avi-awareness' and 'environmental and avi-values' (H_{08}–H_{010}) were rejected.
  - H_{07}: Avi-awareness is not related to critical resources
  - H_8: Avi-awareness is related to enjoyment
  - H_9: Avi-awareness is related to pro-environmental values
  - H_{10}: Avi-awareness is related to utilisation

- The effect of knowledge on critical resources, pro-environmental values and utilisation, the structural path estimates was statistically significant. Consequently, the hypotheses regarding the relationships between 'knowledge' and 'environmental and avi-values', the null hypotheses for H_{011}, H_{013} and H_{014} were rejected.
  - H_{11}: Knowledge is related to critical resources
  - H_{012}: Knowledge is not related to enjoyment
  - H_{13}: Knowledge is related to pro-environmental values
  - H_{14}: Knowledge is related to utilisation

The following section reports on the outcome of the research hypotheses regarding the moderating effect of the knowledge construct in SEM Model 3 (H_{015}–H_{022}).

In SEM Model 3 whether knowledge (M) was postulated as a potential moderator in the relationship between avi-orientation (X), (avi-affinity (X1) and avi-awareness (X2) and avi-values (Y), critical resources (Y1), enjoyment (Y2), pro-environmental values (Y3) and utilisation (Y4). According to the statistical rules for moderation, the following statistical hypotheses were applied (Jose, 2013:11):

4) Hypothesis 1: The X–Y relationship (testing for β_1)

5) Hypothesis 2: The M–Y relationship (testing for β_2)
6) Hypothesis 3: The XM–Y relationship (testing for β_3)[57]

The moderation effects of the moderator variable M in the model occur if Hypothesis 3 (β_3) is statistically significant and Hypothesis 2 (β_2) is not statistically significant. As for Hypothesis 1 (β_1) there are two possibilities that can occur:

3) If Hypothesis 1 is not statistically significant, 'complete moderation' occurs
4) If Hypothesis 1 is statistical significant, 'partial moderation' occurs

In Table 6.15, the role of knowledge in the relationship between avi-orientation and environmental and avi-values as applied in SEM Model 3 is presented according to the statistical rules for moderation. In Table 5.35 the results of the structural model hypotheses (H_{015}–H_{022}) are provided (see Table 4.14 for a summary of the research hypothesis).

[57] The regression coefficient β_3 measures the interaction effect between the independent variable X and moderating variable M. The regression coefficient β_1 measures the simple effects of X on Y when the value of M = 0 (no interaction effects). The test of moderation is operationalised by the product term XM (the multiplication between the two independent variables) in order to test the moderation in the model, one need to test β_3 (the coefficient of interaction term XM). If β_3 is significant, then one could conclude that moderating variable M moderates the relationship between X and Y (Jose, 2013:11).

Table 6.13: The moderating effect of 'environmental and avi-knowledge' in the relationship between 'avi-orientation' and 'environmental and avi-values'

Research hypotheses	Statistical hypothesis	Relationships	Statistical rules for moderation				Conclusion on moderation
			Hypothesis 3 (β_3)	Hypothesis 2 (β_2)	Hypothesis 1 (β_1)		
			Significant	Not significant	Not significant	Significant	
					Complete moderation	Partial moderation	
H_{015}	H1: X1–Y1	Critical resources <--- Avi-affinity	-	-	-	Yes	No moderation
	H2: M–Y1	Critical resources <--- Knowledge	-	No	-	-	
	H3: X1M–Y1	Critical resources <--- intaff	Yes	-	-	-	
H_{016}	H1: X1–Y2	Enjoyment <--- Avi-affinity	-	-	-	Yes	Partial moderation
	H2: M–Y2	Enjoyment <--- Knowledge	-	Yes	-	-	
	H3: X1M–Y2	Enjoyment <--- intaff	Yes	-	-	-	
H_{017}	H1: X1–Y3	PEV <--- Avi-affinity	-	-	-	Yes	No moderation
	H2: M–Y3	PEV <--- Knowledge	-	No	-	-	
	H3: X1M–Y3	PEV <--- intaff	Yes	-	-	-	
H_{018}	H1: X1–Y4	Utilisation <--- Avi-affinity	-	-	-	Yes	No moderation
	H2: M–Y4	Utilisation <--- Knowledge	-	No	-	-	
	H3: X1M–Y4	Utilisation <--- intaff	Yes	-	-	-	

H_{019}	H1: X2–Y1	Critical resources	<---	Avi-awareness	-	-	Yes	-	No moderation
	H2: M–Y1	Critical resources	<---	Knowledge	-	No	-	-	
	H3: X2M–Y1	Critical resources	<---	intaware	No	-	-	-	
H_{020}	H1: X2–Y2	Enjoyment	<---	Avi-awareness	-	-	-	Yes	Partial moderation
	H2: M–Y2	Enjoyment	<---	Knowledge	-	Yes	-	-	
	H3: X2M–Y2	Enjoyment	<---	intaware	Yes	-	-	-	
H_{021}	H1: X2–Y3	PEV	<---	Avi-awareness	-	-	-	Yes	No moderation
	H2: M–Y3	PEV	<---	Knowledge	-	No	-	-	
	H3: X2M– Y3	PEV	<---	intaware	No	-	-	-	
H_{022}	H1: X2–Y4	Utilisation	<---	Avi-awareness	-	-	-	Yes	No moderation
	H2: M–Y4	Utilisation	<---	Knowledge	-	No	-	-	
	H3: X2M–Y4	Utilisation	<---	intaware	Yes	-	-	-	

The results reported in Table 6.13 provided a summary of the moderating effect of knowledge in the relationship between ‘avi-orientation’ and ‘environmental and avi-values’. The statistical rules of moderation (testing for β1, β2 and β3) were used to test the research hypotheses (H_{015}–H_{022}).

Table 6.13 indicated that the research hypotheses of both H_{016} and H_{020} were rejected.

The interaction effect between knowledge and avi-affinity with enjoyment (β3: Hypothesis 3: X1M–Y2) was statistically significant. The relationship between knowledge and enjoyment (β2: Hypothesis 2: M–Y2) was not statistically significant, while the relationship between avi-affinity and enjoyment (β1: Hypothesis 1: X1–Y2) was statistically significant, indicating partial moderation. It could therefore be concluded that the moderator construct (M), in this case the knowledge variable, partially moderates the relationship between avi-affinity (X1) and enjoyment (Y2). Thus, knowledge does moderate the relationship between avi-affinity and enjoyment (H_{20}).

Also the interaction effect between knowledge and avi-awareness with enjoyment (β3: Hypothesis 3: X2M–Y2) was statistically significant. The relationship between knowledge and enjoyment (β2: Hypothesis 2: M–Y2) was not statistically significant, while the relationship between avi-awareness and enjoyment (β1: Hypothesis 1: X2–Y2) was statistically significant, indicating partial moderation. It could therefore be concluded that the moderator construct (M), in this case the knowledge variable, partially moderates the relationship between avi-awareness (X2) and enjoyment (Y2). Thus, knowledge does moderate the relationship between avi-awareness and enjoyment (H_{16}).

The researcher was not only interested in the effect of ‘avi-orientation’ on ‘environmental and avi-values’, but whether this relationship differs according to the level of the learners’ bird and environmental knowledge. The relationship between avi-orientation and environmental and avi-values may be stronger depending on the learners’ knowledge level.

In conclusion, the results indicated that a moderating effect only exists between knowledge and avi-affinity with enjoyment (H_{16}) and between knowledge and avi-awareness with enjoyment (H_{20}).

The SEM model representing the relationships between avi-orientation, knowledge, environmental and avi-values, behavioural intentions and actual behaviour towards birds and the environment in which birds live (building block 3) is discussed next.

6.4 RESULTS OF SEM: BUILDING BLOCK 3: THE RELATIONSHIPS BETWEEN AVI-ORIENTATION, ENVIRONMENTAL AND AVI-KNOWLEDGE, ENVIRONMENTAL AND AVI-VALUES, BEHAVIOURAL INTENTION AND ACTUAL BEHAVIOUR OF SECONDARY SCHOOL LEARNERS

To understand the relationships within and across each building block of the final SEM model, a stepwise process was followed in this study (see Figure 6.2). In the third building block the behaviour constructs, namely behavioural intention and actual behaviour was added, to develop the full model.

As explained in the previous sections, avi-orientation consisted of two latent constructs, namely avi-affinity and avi-awareness, while environmental and avi-knowledge, a calculated observed variable, played a partial moderating role between the avi-affinity and avi-awareness constructs and the environmental and avi-values construct enjoyment.

Behavioural intention of secondary school learners towards birds and bird habitats (added in building block 3), measured by 16 items, were subjected to EFA to determine the underlying factor structure of the data. Applying the EFA, two factors were identified to explain behavioural intension of learners towards birds and bird habitats and were labelled ‘intended pro-environmental and avi-behaviour’ and ‘intended birdwatching behaviour’. The two factors demonstrated acceptable internal consistency as illustrated by the Cronbach’s alpha coefficients (section 5.4.3 for the EFA results).

The last variable added in building block 3, actual behaviour of secondary school learners towards birds, the natural environment and avitourism, measured by 11 items, was also subjected to EFA to determine the underlying factor structure of the data. Applying the EFA, two factors were identified to explain the actual behaviour of learners towards birds and bird habitats and were labelled ‘pro-environmental and avi-behaviour’ and ‘birdwatching behaviour’. The two factors demonstrated acceptable internal consistency as illustrated by the Cronbach’s alpha coefficients (see section 5.4.4 for the EFA results).

This section first outlines the full SEM model with respect to the relationships between avi-affinity, avi-awareness, environmental and avi-knowledge as a moderater, environmental and avi-values, behavioural intentions and actual behaviour (see section 6.4.1 Building block 3: SEM Model 1). Secondly, based on the results of the full SEM model 1, the two constructs (avi-affinity and avi-awareness) were consolidated into one construct (avi-orientation). This model outlines the full SEM model, including the relationships between avi-orientation, environmental and avi-knowledge, environmental and avi-values, behavioural intentions and actual behaviour (see section 6.4.2 Building block 3: SEM Model 2). Also, see Figure 6.3 for the flow of the SEM results.

6.4.1 Building block 3: SEM model 1

The full model includes relationships between avi-affinity, avi-awareness, environmental and avi-knowledge, pro-environmental values, utilisation, enjoyment, critical resources, intended pro-environmental and avi-behaviour, intended birdwatching behaviour, pro-environmental and avi-behaviour and birdwatching behaviour. Figure 6.13 illustrates a SEM model incorporating the structural relationships.

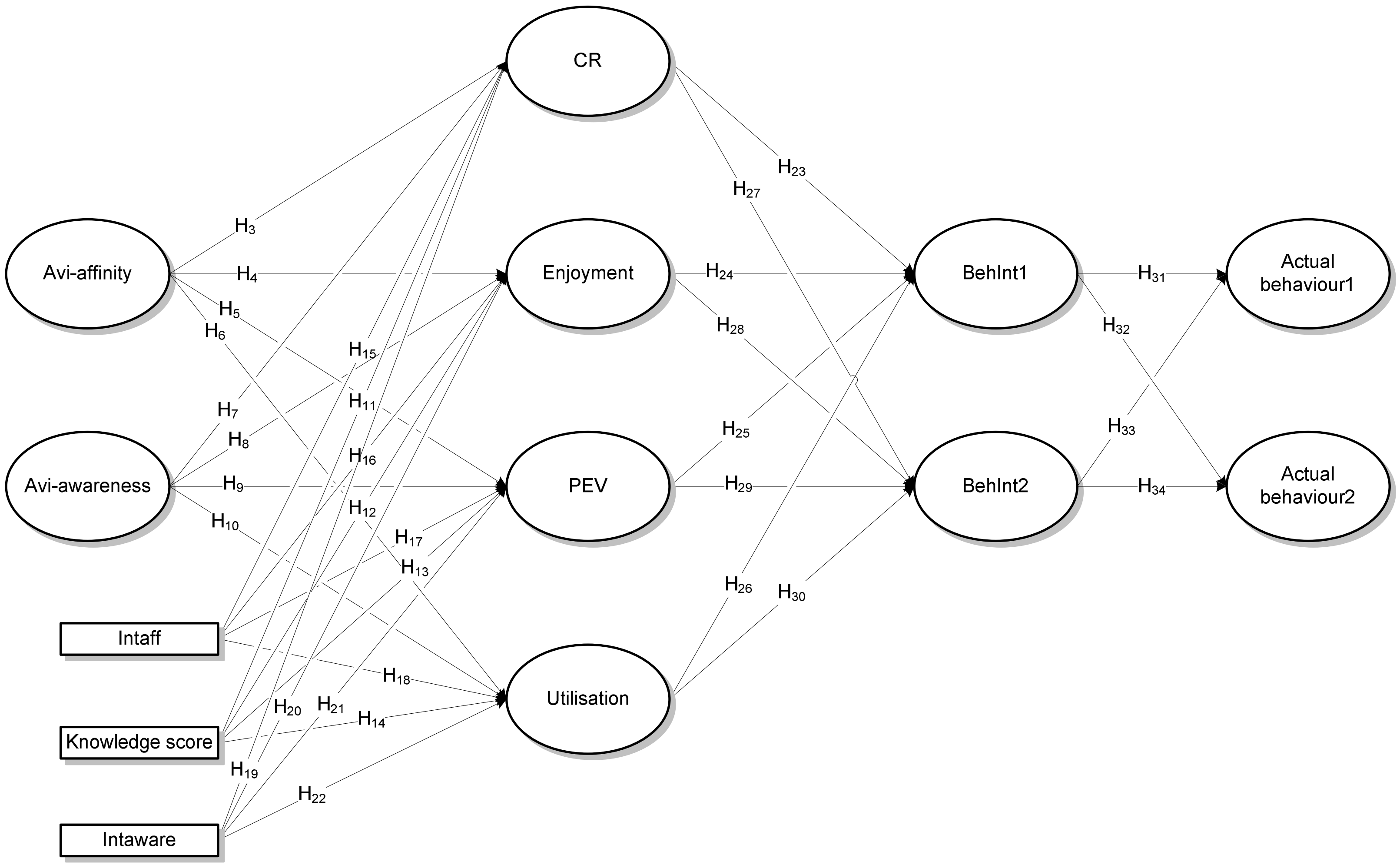

Figure 6.13: Building block 3: Hypothesised path diagram

The final full structural model was tested empirically. The results of the structural model analysis are shown in Figure 6.14.

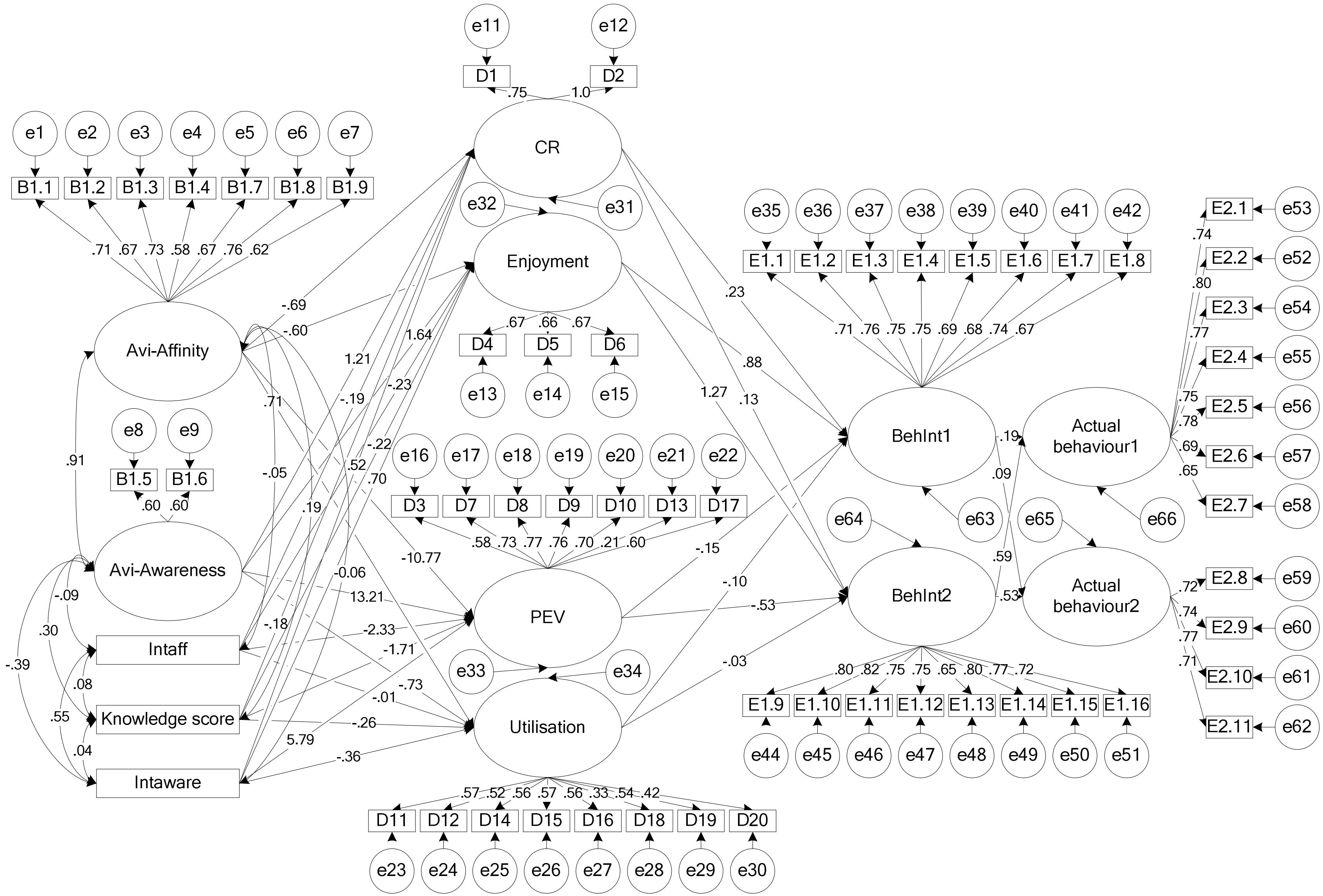

Figure 6.14: Building block 3: SEM model 1

The model parameters as indicated in Figure 6.14, were initially presented using the unobserved (latent) exogenous constructs, avi-affinity and avi-awareness, the observed, exogenous variable knowledge, the exogenous interaction variables avi-affinity (intaff) and avi-awareness (intaware); and the unobserved, endogenous constructs, critical resources, enjoyment, pro-environmental values, utilisation, intended pro-environmental and avi-behaviour, intended birdwatching behaviour, pro-environmental and avi-behaviour and birdwatching behaviour.

Avi-affinity was measured by seven manifest variables (B1.1, B1.2, B1.3, B1.4, B1.7, B1.8, B1.9), avi-awareness by two items (B1.5, B1.6), critical resources by two items (D1, D2), enjoyment by three items (D4, D5, D6), pro-environmental values by seven items (D3, D7, D8, D9, D10, D13, D17), while utilisation was represented by eight items (D11, D12, D14, D15, D16, D18, D19, D20). Intended pro-environmental and avi-behaviour is represented by eight observed variables (E1.1, E1.2, E1.3, E1.4, E1.5, E1.6, E1.7, E1.8), intended birdwatching behaviour by (E1.9, E1.10, E1.11, E1.12, E1.13, E1.14, E1.15, E1.16), pro-environmental and avi-behaviour was represented by eight items (E2.1, E2.2, E2.3, E2.4, E2.7, E2.8, E2.9, E2.8) and birdwatching behaviour also by eight items (E2.1, E2.2, E2.3, E2.4, E2.7, E2.8, E2.9, E2.8). Furthermore, e1–e65 represent the residual error terms associated with the variables.

The dependence relationships in Figure 6.14, were indicated by means of one-headed arrows while covariance relationships were indicated by two-headed arrows.

The model was then evaluated by goodness-of-fit indices to test whether the proposed model emulates the sample matrix. Table 6.14 provides the goodness-of-fit indices of the SEM model 1.

Table 6.14: Goodness-of-fit indices: Building block 3 (SEM model 1)

Model	CMIN (X^2)	df	p	CMIN/df	RMSEA	CFI	TLI	IFI
Goodness-of-fit indices	26187.759	1615	0.000	16.215	0.053	0.847	0.838	0.847
Indicate acceptable fit	-	-	-	<3	≤ 0.08	≥ 0.90	≥ 0.90	≥ 0.90

When the structural model was fitted to the data, the model did not show an acceptable fit. The RMSEA (0.053), with the lower and upper 90% confidence interval ranging between 0.052 and 0.053, indicated an acceptable model fit. However, the CFI (0.847), TLI (0.838) and IFI (0.848) were below 0.90 which did not indicate an acceptable fit. The CMIN/df value of 16,215 was larger than 3, which did not indicate an acceptable fit. When all these fit indices were considered, SEM Model 1 presented an unsatisfactory fit with the observed data.

Although the model did not show a satisfactory fit, the structural parameter estimates are shown and discussed for comparative purposes. Table 6.15 shows the structural parameter estimates, namely unstandardised and standardised regression weights, for the dependence relationships in SEM Model 1.

Table 6.15: Structural parameter estimates: Building block 3 (SEM model 1)

Relationships			Un-standardised regression weights	S.E.	C.R.	P	Standardised regression weights
Critical resources	<---	Avi-affinity	-0.965	0.129	-7.475	***	-0.693
Enjoyment	<---	Avi-affinity	-0.627	0.120	-5.202	***	-0.601
PEV	<---	Avi-affinity	-8.668	3.113	-2.785	0.005**	-10.765
Utilisation	<---	Avi-affinity	0.629	0.074	8.499	***	0.711
Critical resources	<---	Avi-awareness	2.226	0.190	11.743	***	1.211
Enjoyment	<---	Avi-awareness	2.261	0.180	12.533	***	1.640
PEV	<---	Avi-awareness	14.052	4.713	2.981	0.003**	13.213
Utilisation	<---	Avi-awareness	-0.854	0.108	-7.902	***	-0.731
Critical resources	<---	Knowledge	-0.010	0.001	-7.196	***	-0.180
Enjoyment	<---	Knowledge	-0.010	0.001	-7.621	***	-0.223
PEV	<---	Knowledge	-0.057	0.021	-2.670	0.008**	-1.709
Utilisation	<---	Knowledge	-0.010	0.001	-11.386	***	-0.259
Critical resources	<---	intaff	-0.204	0.033	-6.152	***	-0.187
Enjoyment	<---	intaff	-0.185	0.029	-6.318	***	-0.228
PEV	<---	intaff	-1.463	0.520	-2.812	0.005**	-2.329
Utilisation	<---	intaff	0.005	0.018	0.270	0.787	0.007
Critical resources	<---	intaware	0.578	0.057	10.155	***	0.520
Enjoyment	<---	intaware	0.580	0.053	11.031	***	0.695
PEV	<---	intaware	3.726	1.268	2.938	0.003**	5.789
Utilisation	<---	intaware	-0.253	0.032	-7.786	***	-0.358

BehInt1	<---	Critical resources	0.184	0.010	18.485	***	0.231
BehInt1	<---	Enjoyment	0.937	0.032	29.607	***	0.883
BehInt1	<---	PEV	-0.210	0.037	-5.646	***	-0.153
BehInt1	<---	Utilisation	-0.123	0.016	-7.774	***	-0.098
BehInt2	<---	Critical resources	0.115	0.012	9.542	***	0.127
BehInt2	<---	Enjoyment	1.531	0.049	31.230	***	1.267
BehInt2	<---	PEV	-0.830	0.058	-14.327	***	-0.530
BehInt2	<---	Utilisation	-0.043	0.019	-2.225	0.026**	-0.030
Actual behaviour1	<---	BehInt1	0.207	0.021	9.729	***	0.192
Actual behaviour2	<---	BehInt1	0.097	0.024	4.103	***	0.087
Actual behaviour1	<---	BehInt2	0.576	0.023	25.023	***	0.594
Actual behaviour2	<---	BehInt2	0.498	0.020	24.921	***	0.526

*** Significant at 0.1% level of significance (p-value < 0.001)

** Significant at 1% level of significance (p-value < 0.01)

From Table 6.15, some standardised regression coefficients were greater than 1, for example, the relationships between of avi-awareness and critical resources, enjoyment and utilisation, the structural path estimates were significant, and the estimated coefficients were 1.21, 1.64 and -0.72 respectively. According to Jöreskog (1999:1), a common misunderstanding is that the standardised coefficients in a measurement or structural relationship must be less than 1. Furthermore, Deegan (1978:873) condemns the notion that the occurrence of standardised regression coefficients greater than 1 in a model raises questions concerning the legitimacy of such coefficients, and poses problems of interpretation (particularly for those employing path analytic procedures). However, his research demonstrated that standardised regression coefficients greater than 1 can legitimately occur (Deegan, 1978:873). Therefore, when standardised regression coefficients are greater than 1, it does not necessarily imply that something went wrong, although it might suggest that there is a high degree of multicollinearity in the data (Jöreskog, 1999:1; Deegan, 1978:873). Potential existence of multicollinearity[58] was therefore investigated. Since this model did not show a satisfactory fit, SEM model 1 was not interpreted.

Upon investigation of the potential existence of multicollinearity, it was observed that it existed between the two constructs (avi-affinity and avi-awareness) with a correlation value of 0.91. They were subsequently consolidated into one construct (avi-orientation). A refinement of SEM Model 1 is discussed next.

6.4.2 Building block 3: SEM model 2

Figure 6.15 illustrates a SEM model incorporating both the measurement and structural relationships of SEM model 2.

[58] *Multicollinearity* refers to "the extent to which a construct can be explained by the other constructs in the analysis. As multicollinearity increases, it complicates the interpretation of relationships because it is more difficult to ascertain the effect of any single construct owing to their interrelationships (Hair *et al*., 2014:545).

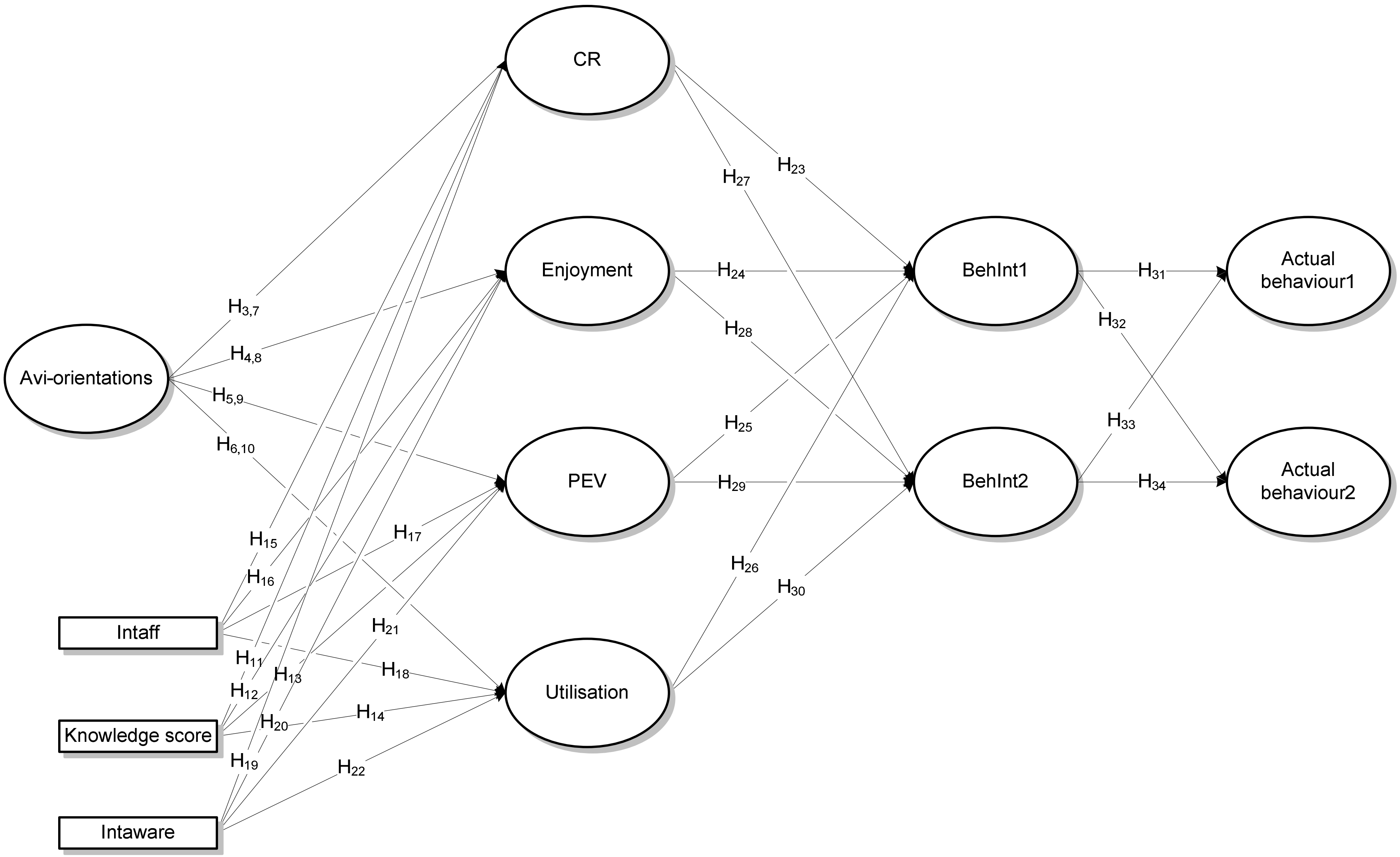

Figure 6.15: Building block 3 (SEM model 2): Hypothesised path diagram

Figure 6.16 shows the results of a SEM Model 2 incorporating both the measurement and structural relationships with respect to avi-orientation, environmental and avi-knowledge, environmental and avi-values, behavioural intentions and actual behaviour.

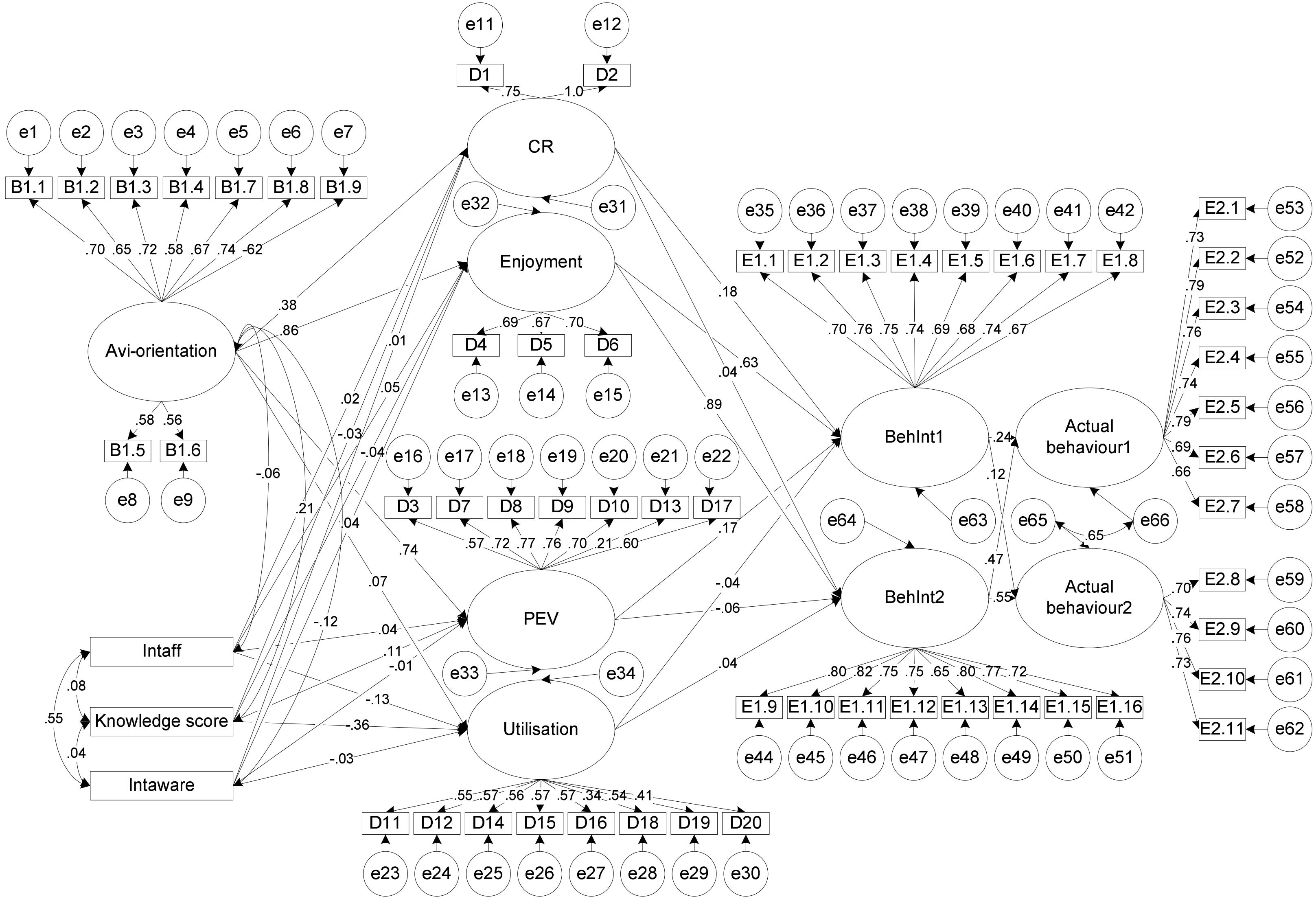

Figure 6.16: Building block 3 (SEM model 2): Relationships between avi-orientation, knowledge, avi-values, behavioural intentions and actual behaviour

In SEM Model 2, the model parameters as indicated in Figure 6.16, were specified as the unobserved (latent) exogenous construct, avi-orientation, the observed, exogenous variable knowledge, interaction variables avi-affinity (intaff) and avi-awareness (intaware), and the unobserved, endogenous constructs, critical resources, enjoyment, pro-environmental values, utilisation, and intended pro-environmental and avi-behaviour, intended birdwatching behaviour, pro-environmental and avi-behaviour and birdwatching behaviour.

Avi-orientation is represented by nine observed variables (B1.1, B1.2, B1.3, B1.4, B1.5, B1.6, B1.7, B1.8, B1.9), critical resources by two items (D1, D2), enjoyment by three items (D4, D5, D6), pro-environmental values by seven items (D3, D7, D8, D9, D10, D13, D17), while utilisation was represented by eight items (D11, D12, D14, D15, D16, D18, D19, D20). Intended pro-environmental and avi-behaviour is represented by eight observed variables (E1.1, E1.2, E1.3, E1.4, E1.5, E1.6, E1.7, E1.8), intended birdwatching behaviour by eight items (E1.9, E1.10, E1.11, E1.12, E1.13, E1.14, E1.15, E1.16), actual pro-environmental and avi-behaviour were represented by eight items (E2.1, E2.2, E2.3, E2.4, E2.7, E2.8, E2.9, E2.8) and actual birdwatching behaviour also by eight items (E2.1, E2.2, E2.3, E2.4, E2.7, E2.8, E2.9, E2.8) (see Annexure A: Questionnaire, Section B1, D, E1 and E2 for variables labels). Furthermore e1–e66 represent the error terms associated with the variables.

The dependence relationships in Figure 6.16 were indicated by means of one-headed arrows, while covariance relationships were indicated by two-headed arrows.

SEM Model 2 was then evaluated by goodness-of-fit indices, which are depicted in Table 6.16.

Table 6.16: Goodness-of-fit indices: Building block 3 (SEM Model 2)

Model	CMIN (X^2)	df	p	CMIN/df	RMSEA	CFI	TLI	IFI
Goodness of fit indices	28099.028	1623	0.000	17.313	0.054	0.835	0.826	0.835
Indicate acceptable fit	-	-	-	<3	≤ 0.08	≥ 0.90	≥ 0.90	≥ 0.90

The RMSEA (0.054), with the lower and upper 90% confidence interval ranging between 0.054 and 0.055, indicated that the model fit adequately. However, the CFI (0.835), TLI (0.826) and IFI (0.835) were slightly below 0.90, which did not indicate an acceptable fit. The CMIN/df value of 17,313 was larger than 3, which also does not indicate an acceptable fit.

Since the model did not show an acceptable model fit, additional covariances between residual error terms were included in the model. Modification indices showed that the measurement errors e66 and e65 were moderately correlated. Corresponding constructs of e65 and e66 were Actual behaviour1 ('actual pro-environmental and avi-behaviour') and Actual behaviour2 ('actual birdwatching behaviour'). For the actual behaviour construct, two factors were extracted in the factor analysis. The relationship found potentially indicate that actual behaviour of learners towards birds, the natural environment and avitourism can be reconsidered to be an unidimensional construct (although identified as two factors through exploratory factor analysis) through future research.

After additional covariances were included, SEM Model 2 was evaluated by goodness-of-fit indices, which are depicted in Table 6.17.

Table 6.17: Goodness-of-fit indices: Building block 3 (SEM Model 2) with additional covariances

Model	CMIN (X^2)	df	p	CMIN/df	RMSEA	CFI	TLI	IFI
Goodness of fit indices	26580.524	1622	0.000	16.387	0.053	0.844	0.836	0.845
Indicate acceptable fit	-	-	-	<3	≤ 0.08	≥ 0.90	≥ 0.90	≥ 0.90

When the SEM model was fitted to the data, the model showed a similar fit, but not an adequate fit. The RMSEA (0.053), with the lower and upper 90% confidence interval ranging between 0.052 and 0.054, indicated that the model fit adequately.

However, the CFI (0.844), TLI (0.836) and IFI (0.845) were slightly below 0.90, which did not indicate an acceptable fit. Although the model did not show a satisfactory fit, the structural parameter estimates are shown and discussed for comparative purposes.

The unstandardised and standardised regression weights for the dependence relationships in SEM model 2 are presented in Table 6.18.

Table 6.18: Structural parameter estimates: Building block 3 (SEM Model 2)

Relationships			Un-standardised regression weights	S.E.	C.R.	P	Standardised regression weights
Critical resources	<---	Avi-orientation	0.549	0.022	25.330	***	0.384
Enjoyment	<---	Avi-orientation	0.955	0.023	42.358	***	**0.859**
PEV	<---	Avi-orientation	0.597	0.017	34.144	***	**0.737**
Utilisation	<---	Avi-orientation	0.059	0.014	4.075	***	0.065
Critical resources	<---	Knowledge	-0.001	0.001	-1.901	0.057	-0.025
Enjoyment	<---	Knowledge	-0.002	0.000	-3.827	***	-0.041
PEV	<---	Knowledge	0.004	0.000	9.484	***	0.109
Utilisation	<---	Knowledge	-0.013	0.001	-21.036	***	-0.360
Critical resources	<---	intaff	-0.002	0.000	-3.827	***	0.022
Enjoyment	<---	intaff	-0.002	0.000	-3.827	***	0.053
PEV	<---	intaff	0.045	0.010	4.364	***	0.039
Utilisation	<---	intaff	-0.087	0.012	-7.149	***	-0.127
Critical resources	<---	intaware	.011	0.017	0.680	0.497	0.010
Enjoyment	<---	intaware	0.034	0.010	3.240	0.001**	0.039
PEV	<---	intaware	-0.006	0.008	-0.699	0.484	-0.009
Utilisation	<---	intaware	-0.022	0.012	-1.810	0.070	-0.032
BehInt1	<---	Critical resources	0.143	0.008	16.976	***	0.182
BehInt1	<---	Enjoyment	0.638	0.020	31.773	***	**0.629**
BehInt1	<---	PEV	0.241	0.022	10.913	***	0.173
BehInt1	<---	Utilisation	-0.050	0.014	-3.581	***	-0.040
BehInt2	<---	Critical resources	0.032	0.009	3.474	***	0.035
BehInt2	<---	Enjoyment	1.039	0.028	37.437	***	**0.888**
BehInt2	<---	PEV	-0.098	0.026	-3.810	***	-0.061
BehInt2	<---	Utilisation	0.064	0.016	4.009	***	0.044

Actual behaviour1	<---	BehInt1	0.256	0.019	13.222	***	0.239
Actual behaviour2	<---	BehInt1	0.128	0.021	6.153	***	0.119
Actual behaviour1	<---	BehInt2	0.439	0.018	24.809	***	**0.472**
Actual behaviour2	<---	BehInt2	0.513	0.020	25.456	***	**0.549**

*** Significant at 0.1% level of significance (p-value < 0.001)

** Significant at 1% level of significance (p-value < 0.01)

Table 6.18 indicated the relationships of avi-orientation with critical resources, enjoyment; pro-environmental values and utilisation, the structural path estimates were statistically significant, and the estimated standardised regression coefficients were all positive with values of 0.38, 0.86, 0.74 and 0.07 respectively. The sizes of these coefficients indicate that avi-orientation had the strongest positive relationship with enjoyment (0.86) and pro-environmental values (0.74), a moderate effect on critical resources (0.38) and a very weak relationship with utilisation (0.07).

Furthermore, Table 6.18 showed that the relationship between knowledge and critical resources was not statistically significant, while with regard to the relationship between knowledge and enjoyment, pro-environmental values and utilisation, the structural path estimates were statistically significant. The sizes of the standardised regression coefficients indicated that knowledge had a positive, but very weak effect on pro-environmental values (0.11), a negative, very weak effect on enjoyment (-0.04), while knowledge had a negative, moderate effect on utilisation (-0.36).

Considering the interaction effect between knowledge and avi-affinity with critical resources, enjoyment; pro-environmental values and utilisation, the structural path estimates were statistically significant, and the estimated standardised regression coefficients were 0.02, 0.05, 0.04 and -0.13 respectively. The interaction effect between avi-affinity and knowledge had a positive, but very weak effect on critical resources (0.02), enjoyment (0.05), pro-environmental values (0.04), whereas this interaction effect, had a negative, weak effect on utilisation (-0.13). The results thus indicated that the interaction effect between knowledge and avi-affinity had an effect, although very weak, on critical resources, enjoyment, pro-environmental values and utilisation.

Regarding the interaction effect between knowledge and avi-awareness with critical resources, enjoyment; pro-environmental values and utilisation, Table 6.18 showed that the structural path estimates between ‘intaware’ and enjoyment were statistically significant, while with critical resources, pro-environmental values and utilisation, were not statistically significant. The results thus indicated that the interaction effect between knowledge and avi-awareness had an effect on enjoyment.

Regarding the relationship of critical resources, enjoyment; pro-environmental values and utilisation with intended pro-environmental and avi-behaviour (BehInt1), the structural path estimates were statistically significant, and the estimated standardised regression coefficients were 0.18, 0.63, 0.17 and -0.04 respectively. The sizes of these coefficients indicate that critical resources (0.18) and pro-environmental values (0.17) had a positive, but weak effect on intended pro-environmental and avi-behaviour (BehInt1), while enjoyment had a positive, strong effect on intended pro-environmental *and* avi-behaviour (BehInt1) (0.63). On the other hand, the results indicated that utilisation has a negative, very weak effect on intended pro-environmental and avi-behaviour (BehInt1) (-0.04).

Also, for the effect of critical resources, enjoyment; pro-environmental values and utilisation on intended birdwatching behaviour (BehInt2), the structural path estimates was statistically significant, and the estimated regression coefficients were 0.04, 0.89, -0.06 and 0.04 respectively. The sizes of these coefficients indicated that critical resources (0.04) and utilisation (0.04) had a positive, but very weak effect on intended birdwatching behaviour *(BehInt2)*, while enjoyment (0.89) had a positive, very strong relationship with intended birdwatching behaviour (BehInt2). Interestingly, the results indicated that pro-environmental values had a negative and very weak effect on intended birdwatching behaviour (BehInt2) (-0.04).

Considering the relationships of intended pro-environmental and avi-behaviour (BehInt1) with actual pro-environmental and avi-behaviour (Actual behaviour1) and actual birdwatching behaviour (Actual behaviour2), the structural path estimates were statistically significant, and the estimated standardised regression coefficients were 0.24, and 0.12 respectively. These results indicated that intended pro-environmental and avi-behaviour had a stronger positive effect on actual pro-environmental and avi-behaviour (0.24) than on actual birdwatching behaviour (0.12).

Regarding the relationship between intended birdwatching behaviour (BehInt2) with actual pro-environmental and avi-behaviour (Actual behaviour1) and actual birdwatching behaviour (Actual behaviour2), the structural path estimates were statistically significant, and the estimated standardised regression coefficients were 0.47, and 0.55 respectively. These results indicate that a strong positive relationship exist between intended birdwatching behaviour and both actual pro-environmental and avi-behaviour (0.47) and actual birdwatching behaviour (0.55). However, as expected, the relationship between intended birdwatching behaviour and actual birdwatching behaviour was the stronger relationship (0.55).

However, when SEM Model 1 and SEM Model 2 were compared, the standardised regression weights in SEM Model 1 posed problems for interpretation since the standardised regression coefficients were greater than 1. Although SEM Model 2 provides an improvement over SEM Model 1 in terms of the standardised regression coefficients that were interpretable, and the RMSEA value indicated a good fit (0.053), the CFI, TLI and CFI values were slightly below 0.90 and therefore the model could not be regarded as acceptable. Therefore, two options to improve model fit were explored (see Figure 6.3, refinement of SEM). First, theoretically justifiable modification indices were considered (see section 6.5) leading to the final SEM model (see section 6.6) and secondly, the role of the involvement was explored in the proposed SEM model (see section 6.7). Modification indices are presented next.

6.5 RESULTS OF SEM: REFINEMENT OF SEM: COVARIANCE RELATIONSHIPS

The previous section outlined the stepwise process that was followed to understand the relationships between the building blocks of the final SEM model (see Figure 6.2). The outcome of this process offered a full SEM model (Building block 3, Model 2) indicating the structural paths between avi-orientation, environmental and avi-knowledge, environmental and avi-values, behavioural intentions and actual behaviour of secondary school learners. However, as indicated in the previous section, the model fit was not adequate. In order to refine and improve the full model, modification indices were considered. The researcher is aware of a potential misuse of adding correlated errors to the model to improve model fit (Hair *et al.*, 2014:559). However, in the next models that were considered, the additional correlated errors that were added to the model could a) be theoretically justified and b) provided new insight into potential latent constructs that should be added in considering a conceptual model for an avi-specific model versus a general environmental model. These relationships potentially indicate that the construction of the avi-specific constructs needs to be reconsidered through future research.

The structural models (SEM Models 1–4) were tested empirically and the model fit statistics were interpreted (see Figure 6.3, Refinement of SEM: Covariance relationships). First, four covariances were included in the full model. Table 6.19 shows the structural parameter estimates.

Table 6.19: Structural parameter estimates: SEM model 1 (Four covariances)

			Correlations
e66	<--->	e65	0.642
e45	<--->	e44	0.512
e9	<--->	e8	0.506
e4	<--->	e38	0.286

In Table 6.19 modification indices showed that the residual error terms e8 and e9; e44 and e45; e4 and e38; and e65 and e66 were correlated.

The corresponding items of e8 and e9 were B1.5 (‘People need to take better care of birds’) and B1.6 (‘People need to take better care of bird habitats’). Both items refer to people that need to take better care of either birds or bird habitat and were the original eco-awareness construct.

Furthermore, due to the standardised weights being larger than one due to high multicollinearity between eco-awareness and eco-affinity (see Figure 6.16, building block 3: SEM Model 2), the environmental orientation latent construct was considered as one construct. Thus, this relationship was considered important to include in the improved model.

The same argument could be followed for e44 and e45, which correspond to items E1.9 ('I am willing to buy a bird book to assist me in identifying birds') and E1.10 ('I am willing to buy a bird book to learn more about birds and bird habitats'). In the original questionnaire, the both items were new items added to the original items. As both items refer to willingness to buy a bird book, the correlated errors are understandable.

The corresponding items of e4 and e38 were B1.4 ('I would give some of my own money to help save birds') and E1.4 ('I would be willing to give my own money to protect bird habitats'). In this case, both items refer to learners' willingness to give money to protect birds, thus the correlated errors seem sensible.

Lastly, corresponding constructs of e65 and e66 were Actual behaviour1 ('actual pro-environmental and avi-behaviour') and Actual behaviour2 ('actual birdwatching behaviour'). In the original questionnaire, the Actual behaviour2 were new items added to the original items. For the actual behaviour construct, two factors were extracted in the factor analysis. However, both factors refer to the actual behaviour of learners towards birds and the environment in which birds live.

The SEM Model 1, with four covariances, was then evaluated by goodness-of-fit indices to test whether the proposed model emulates the sample matrix. Table 6.20 provides the goodness-of-fit indices of the SEM model, with four covariances.

Table 6.20: Goodness-of-fit indices: SEM model 1 (Four covariances)

Model	CMIN (X^2)	df	p	CMIN/df	RMSEA	CFI	TLI	IFI
Goodness-of-fit indices	23329.864	1624	0.000	14.366	0.049	0.865	0.857	0.865
Indicate acceptable fit	-	-	-	<3	≤ 0.08	≥ 0.90	≥ 0.90	≥ 0.90

When the structural model was fitted to the data, the model did not show an adequate fit. The RMSEA (0.049), with the lower and upper 90% confidence interval ranging between 0.049 and 0.050, indicates that the model show adequate fit. However, the CFI (0.865), TLI (0.857) and IFI (0.865) were stil below 0.90, which indicated that the model fit is not adequate. The CMIN/df value of 14,366 was larger than 3, which also did not indicate an acceptable fit. When all these fit indices were considered, the SEM model 1, with four covariances, presented an unsatisfactory fit with the observed data. Modification indices were further studied, and an additional five covariances were added in SEM Model 2, and are presented next.

Table 6.21 shows the structural parameter estimates, namely correlations.

Table 6.21: Structural parameter estimates: SEM model 2 (Nine covariances)

			Correlations
e66	<-->	e65	0.642
e4	<-->	e38	0.288
e9	<-->	e8	0.497
e45	<-->	e44	0.509
e2	<-->	e1	0.348
e11	<-->	e31	-0.404
e13	<-->	e14	0.182
e11	<-->	e12	0 (restricted)
e25	<-->	e26	0.200

In Table 6.21 the five additional modification indices that were added in SEM Model 2 are displayed, indicating that the measurement errors e1 and e2; e11 and e12; e11 and e31; e13 and e14; and e25 and e26 were correlated.

Modification indices showed that the measurement errors e1 and e2 were correlated. The corresponding items were B1.1 ('I like to learn about different bird species') and B1.2 ('I like to read about birds'). Both items refer to gaining more knowledge, as the items refer to reading and learning about birds and different bird species.

The corresponding items of e11 and e31 were D1 ('I save water because it is important for the survival of birds') and the critical resources construct. Also in this case, saving water is part of the critical resources construct, thus the correlated errors seems plausible.

The corresponding items of e13 and e14 were D4 ('I enjoy trips to the countryside in order to observe birds in their natural habitat') and D5 ('Sitting at the edge of a pond watching birds in flight is enjoyable). Both items refer to the enjoyment of observing and watching birds.

Lastly, corresponding constructs of e25 and e26 were D14 ('Our planet has unlimited resources') and D15 ('Nature is always able to restore itself'). Both items refer to natural resources that are unlimited or able to restore itself. It is therefore conceivable that measurement errors could be correlated.

The SEM model, with nine covariances, was then evaluated by goodness-of-fit indices to test whether the proposed model emulates the sample matrix. Table 6.22 provides the goodness-of-fit indices of the SEM model, with nine covariances.

Table 6.22: Goodness-of-fit indices: SEM model 2 (Nine covariances)

Model	CMIN (X^2)	df	p	CMIN/df	RMSEA	CFI	TLI	IFI
Goodness-of-fit indices	21096.623	1619	0.000	13.031	0.047	0.879	0.872	0.879
Indicate acceptable fit	-	-	-	<3	≤ 0.08	≥ 0.90	≥ 0.90	≥ 0.90

When the structural model was fitted to the data, the model did not show an acceptable fit. The RMSEA (0.047), with the lower and upper 90% confidence interval ranging between 0.046 and 0.047, indicated an acceptable model fit. However, the CFI (0.879), TLI (0.872) and IFI (0.879) were still below 0.90 which indicated not an acceptable fit. The CMIN/df value of 13,031 was larger than 3, which also did not indicate an acceptable fit. Therefore, when all these fit indices were considered, the SEM Model 2, with nine covariances, presented an unsatisfactory fit with the observed data. Modification indices were further considered, and an additional four covariances were added to the model with nine covariances. The SEM model with 13 covariances is presented next.

Table 6.23 shows the structural parameter estimates, namely correlations.

Table 6.23: Structural parameter estimates: SEM model 3 (13 covariances)

			Correlations
e66	<-->	e65	0.657
e4	<-->	e38	0.288
e9	<-->	e8	0.497
e45	<-->	e44	0.498
e2	<-->	e1	0.348
e11	<-->	e31	-0.406
e13	<-->	e14	0.184
e11	<-->	e12	0 (restricted)
e25	<-->	e26	0.419

e47	<-->	e46	0.277
e58	<-->	e57	0.203
e59	<-->	e60	-0.176
e59	<-->	e62	0.401

Modification indices in Table 6.23 indicated that the residual error terms e46 and e47, e57 and e58; e59 and e60; and e59 and e62 were correlated.

Modification indices showed that the measurement errors e46 and e47 were correlated. The corresponding items were E1.11 ('I am willing to talk to my teachers about a bird club at school') and E1.12 ('I am willing to join a local birdwatching club'). Since these items were adjacent in the questionnaire, it is conceivable that measurement errors could be correlated. Also, both items refer to talking about or joining a bird club.

The same argument could be followed for e57 and e58, which correspond to items E2.6 ('I read stories that are mostly about birds') and E2.7 ('I have talked to someone about a birdwatching club at school'). Both items, reading about birds or talking about a bird club, refer to interest in birds or birding.

The corresponding items of e59 and e60 were E2.8 ('I have visited a bird park') and E.2.9 ('I have been on a birdwatching tour in a nature reserve'). Also in this case, both items refer to a physical activity specifically for birds, namely visiting a bird park or going on a birding tour.

Lastly, the corresponding items of e59 and e62 were E2.8 ('I have visited a bird park'') and E2.11 ('I have visited the local museum to learn more about birds'). The same argument could be followed in this case, as both items refer to a physical activity specifically regarding birds, namely visiting a bird park or visiting a local museum to learn about birds.

The SEM model, with 13 covariances, was then evaluated by goodness-of-fit indices to test whether the proposed model emulates the sample matrix. Table 6.24 provides the goodness-of-fit indices of the SEM model with 13 covariances.

Table 6.24: Goodness-of-fit indices: SEM model 3 (13 covariances)

Model	CMIN (X^2)	df	p	CMIN/df	RMSEA	CFI	TLI	IFI
Goodness-of-fit indices	19353.657	1615	0.000	11.984	0.045	0.889	0.883	0.889
Indicate acceptable fit	-	-	-	<3	≤ 0.08	≥ 0.90	≥ 0.90	≥ 0.90

When the structural model was fitted to the data, the model did not show an acceptable fit. RMSEA (0.045), with the lower and upper 90% confidence interval ranging between 0.044 and 0.045, indicated a good model fit. However, the CFI (0.889), TLI (0.883) and IFI (0.889) although slightly below 0.90 still did not indicate an acceptable fit. The CMIN/df value of 11,984 was larger than 3, also did not indicate an acceptable fit. Therefore, when all these fit indices were considered, the SEM model with 13 covariances presented an unsatisfactory fit with the observed data. Therefore, additional modification indices were studied and an additional five covariances were added to the model. In order to optimise the SEM model, 18 covariances were included in the final model.

Table 6.25 shows the structural parameter estimates, namely correlations.

Table 6.25: Structural parameter estimates: SEM model 4 (18 covariances)

			Correlations
e66	<-->	e65	0.657
e4	<-->	e38	0.288
e9	<-->	e8	0.497
e45	<-->	e44	0.498
e2	<-->	e1	0.348
e11	<-->	e31	-0.406
e13	<-->	e14	0.184
e11	<-->	e12	0 (restricted)
e25	<-->	e26	0.200
e47	<-->	e46	0.419
e58	<-->	e57	0.277
e59	<-->	e60	0.203
e59	<-->	e62	-0.176
e52	<-->	e53	0.401
e51	<-->	e61	0.234
e21	<-->	e24	0.137
e21	<-->	e34	0.226
e50	<-->	e49	0.290

Modification indices in Table 6.25 showed that the residual error terms e49 and e50; e52 and e53; e51 and e61; e21 and e24; and e21 and e34 were correlated.

Modification indices showed that the residual error terms e49 and e50 were correlated. The corresponding items were E1.14 ('I would be willing to go on a birdwatching tour in my area') and E1.15 ('I would be willing to go on a birdwatching tour in a nature reserve'). Since these items were adjacent in the questionnaire, it is conceivable that measurement errors could be correlated. Furthermore, both items refer to willingness to go on a birdwatching tour.

Modification indices showed that the residual error terms e52 and e53 were correlated. The corresponding items were E2.1 ('I have talked to someone about pollution that causes destruction of bird habitats') and E2.2 ('I have talked to someone about how to limit environmental problems that affect bird habitats'). Since these items were adjacent in the questionnaire, it is conceivable that measurement errors could be correlated. Furthermore, both items refer to communication regarding environmental problems affecting bird habitats.

The same argument could be followed for e51 and e61, which correspond to items E1.16 ('I would like to visit the local zoo to learn more about birds') and E2.10 ('I have visited the local zoo to learn more about birds'). As both items refer to visiting the local zoo to learn more about birds, the correlated errors are understandable.

The corresponding items of e21 and e24 were D13 ('We should remove garden weeds to help flowers grow') and D12 ('We need to clear bird habitats in order to grow crops'). Furthermore, both items refer to the removing or clearing bird habitat.

Lastly, the corresponding items of e21 and e34 were D13 ('We should remove garden weeds to help flowers grow') and the utility construct. Also in this case, removing garden weeds, could be viewed as part of the utility construct, since it refers to removing natural resources to grow flowers that might not be part of the natural vegetation of the area, thus the correlated errors seems plausible.

The SEM Model 4 was then evaluated by goodness-of-fit indices, which are depicted in Table 6.26.

Table 6.26: Goodness-of-fit indices: SEM model 4 (18 covariances)

Model	CMIN (X^2)	df	p	CMIN/df	RMSEA	CFI	TLI	IFI
Goodness-of-fit indices	17714.855	1610	0.000	11.003	0.043	0.900	0.893	0.900
Indicate acceptable fit	-	-	-	<3	≤ 0.08	≥ 0.90	≥ 0.90	≥ 0.90

When the SEM model was fitted to the data, the goodness-of-fit supported the measurement model. The RMSEA (0.043), with the lower and upper 90% confidence interval ranging between 0.042 and 0.043, indicated a good model fit. The CFI (0.900) and IFI (0.900) were all greater than 0.90, which indicate that the model fit the data.

As noted in the model fit summary, the SEM model with 18 covariances offered the best model fit. The additional covariance relationships are perceived to be because of items that were adapted to the context of this study as well as new items that were added in the questionnaire (see section 4.4).

6.6 RESULTS OF SEM: FINAL SEM MODEL

The final SEM model, based on the results of the refinement of SEM presented in section 6.5, is presented in this section (see Figure 6.3). The final SEM model for sustainable avitourism is presented in Figure 6.17.

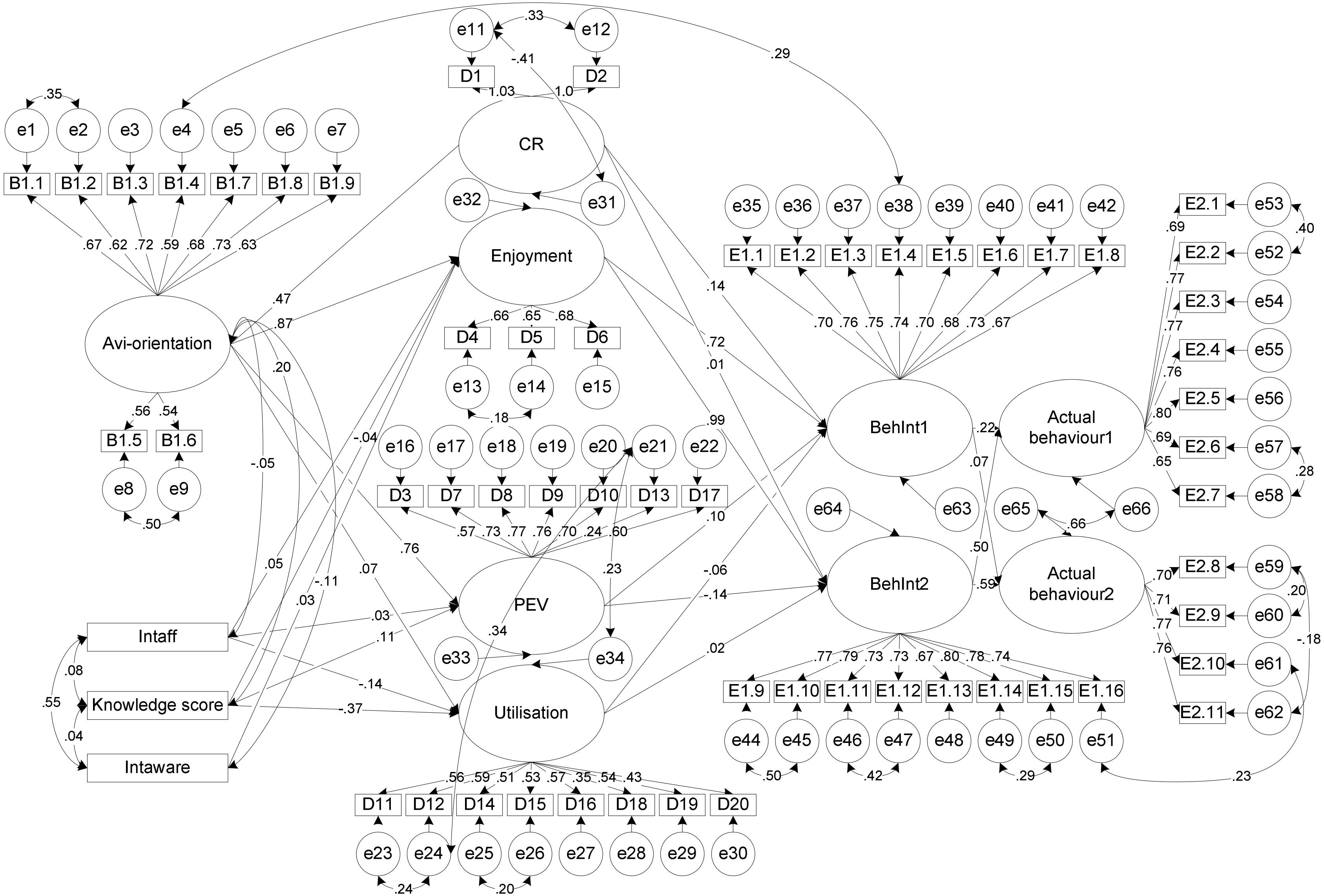

Figure 6.17: Final SEM model

In Figure 6.17, the final SEM model represented the relationships of learners' avi-orientation, knowledge, critical resources, enjoyment, pro-environmental values, utilisation, behavioural intentions and actual behaviour. Final structural model parameters as indicated in Figure 6.17, were specified as the unobserved (latent), exogenous construct, avi-orientation, the observed, exogenous variable, knowledge, the exogenous interaction variables avi-affinity (intaff) and avi-awareness (intaware); and the unobserved, endogenous constructs, critical resources, enjoyment, pro-environmental values, utilisation, intended pro-environmental and avi-behaviour (BehInt1), intended birdwatching behaviour (BehInt2), pro-environmental and avi-behaviour (Actual behaviour1) and birdwatching behaviour (Actual behaviour2).

Avi-orientation is represented by nine observed variables (B1.1, B1.2, B1.3, B1.4, B1.5, B1.6, B1.7, B1.8, B1.9), critical resources by two items (D1, D2), enjoyment by three items (D4, D5, D6), pro-environmental values by seven items (D3, D7, D8, D9, D10, D13, D17), while utilisation was represented by eight items (D11, D12, D14, D15, D16, D18, D19, D20). Intended pro-environmental and avi-behaviour is represented by eight observed variables (E1.1, E1.2, E1.3, E1.4, E1.5, E1.6, E1.7, E1.8), intended birdwatching behaviour by eight items (E1.9, E1.10, E1.11, E1.12, E1.13, E1.14, E1.15, E1.16), actual pro-environmental and avi-behaviour was represented by eight items (E2.1, E2.2, E2.3, E2.4, E2.7, E2.8, E2.9, E2.8) and actual birdwatching behaviour also by eight items (E2.1, E2.2, E2.3, E2.4, E2.7, E2.8, E2.9, E2.8) (see Annexure A: Questionnaire, Section B1, D, E1 and E2 for variable labels). Furthermore, e1–e66 represent the error terms associated with the variables.

The dependence relationships in Figure 6.17 were indicated by means of one-headed arrows, while covariance relationships were indicated by two-headed arrows. For the final model, additional covariances between measurement errors, where theoretically justified, were included in the model.

The unstandardised and standardised regression weights for the structural paths of the final SEM model are presented in Table 6.27.

Table 6.27: Structural parameter estimates: Final SEM Model

Relationships			Unstandardised regression weights	S.E.	C.R.	P	Standardised regression weights
Critical resources	<---	Avi-orientation	0.732	0.021	35.559	***	**0.471**
Enjoyment	<---	Avi-orientation	0.969	0.024	40.328	***	**0.874**
PEV	<---	Avi-orientation	0.641	0.019	34.060	***	**0.760**
Utilisation	<---	Avi-orientation	0.072	0.015	4.658	***	0.074
Enjoyment	<---	Knowledge	-0.001	0.000	-3.318	***	-0.035
PEV	<---	Knowledge	0.004	0.000	9.823	***	0.111
Utilisation	<---	Knowledge	-0.014	0.001	-21.706	***	-0.365
Enjoyment	<---	intaff	0.044	0.009	4.666	***	0.054
PEV	<---	intaff	0.021	0.007	3.144	0.002**	0.034
Utilisation	<---	intaff	-0.100	0.010	-9.544	***	-0.141
Enjoyment	<---	intaware	0.024	0.010	2.491	0.013**	0.028
BehInt1	<---	Critical resources	0.106	0.008	12.876	***	0.140
BehInt1	<---	Enjoyment	0.755	0.023	32.777	***	**0.717**
BehInt1	<---	PEV	0.133	0.023	5.879	***	0.096
BehInt1	<---	Utilisation	-0.077	0.014	-5.627	***	-0.063
BehInt2	<---	Critical resources	0.012	0.009	1.306	0.191	0.013
BehInt2	<---	Enjoyment	1.227	0.033	37.056	***	**0.992**
BehInt2	<---	PEV	-0.223	0.029	-7.656	***	-0.137
BehInt2	<---	Utilisation	0.028	0.016	1.735	0.083	0.019
Actual behaviour1	<---	BehInt1	0.223	0.022	10.295	***	0.215
Actual behaviour2	<---	BehInt1	0.075	0.024	3.163	0.002**	0.070
Actual behaviour1	<---	BehInt2	0.539	0.023	23.920	***	**0.495**
Actual behaviour2	<---	BehInt2	0.438	0.020	22.404	***	**0.590**

*** Significant at 0.1% level of significance (p-value < 0.001)

** Significant at 1% level of significance (p-value < 0.01)

Table 6.27 indicated the relationships of avi-orientation with critical resources, enjoyment, pro-environmental values and utilisation, the structural path estimates were statistically significant, and the estimated standardised regression coefficients were all positive values of 0.47, 0.87, 0.76 and 0.07 respectively. The sizes of these coefficients indicated that avi-orientation had the strongest positive relationship with enjoyment (0.87) and pro-environmental values (0.76), a moderate to strong relationship with critical resources (0.47) and a very weak relationship with utilisation (0.07).

Furthermore, Table 6.27 showed that the effect of knowledge on enjoyment, pro-environmental values and on utilisation, the structural path estimates were statistically significant. The sizes and direction of these coefficients indicated that knowledge had a positive, but weak relationship with pro-environmental values (0.11), a negative, very weak effect on enjoyment (-0.04), while knowledge had a negative, moderate effect on utilisation (-0.37).

Considering the interaction *effect* between knowledge and avi-affinity with enjoyment, pro-environmental values and utilisation, the structural path estimates were statistically significant, and the estimated standardised regression coefficients were 0.05, 0.03 and -0.14 respectively. Whereas the *interaction effect* between knowledge and avi-affinity with critical resources was not statistically significant. The interaction effect between avi-affinity and knowledge had a positive, but weak effect on enjoyment (0.05) and pro-environmental values (0.03), whereas this interaction effect had a negative, weak effect on utilisation (-0.14). The results thus indicated that the interaction effect between knowledge and avi-affinity had an effect on enjoyment, pro-environmental values and utilisation.

Table 6.28 showed that the interaction effect between knowledge and avi-awareness with critical resources, pro-environmental values and utilisation, the structural path estimates was not statistically significant. Regarding the interaction effect between knowledge and avi-awareness with enjoyment, the structural path estimates was statistically significant, and the estimated standardised regression coefficient was 0.03. The interaction effect between avi-awareness and knowledge had a positive, but weak effect on enjoyment (0.03).

Regarding the effect of critical resources, enjoyment; pro-environmental values and utilisation on intended pro-environmental and avi-behaviour (BehInt1), the structural path estimates was statistically significant, and the standardised regression coefficients were 0.14, 0.72, 0.10 and -0.06 respectively. The sizes and direction of these coefficients indicate that critical resources (0.14) and pro-environmental values (0.10) had a positive, but weak effect on intended pro-environmental and avi-behaviour (BehInt1), while enjoyment had a positive, strong relationship with intended pro-environmental and avi-behaviour (BehInt1) (0.72). On the other hand, the results indicated that utilisation had a negative, weak effect on intended pro-environmental and avi-behaviour (BehInt1) (-0.06).

Also the effect of enjoyment and pro-environmental values on intended birdwatching behaviour (BehInt2), the structural path estimates was statistically significant, and the estimated coefficients were 0.99, and -0.14 respectively. Enjoyment had a positive, very strong relationship with intended birdwatching behaviour (BehInt2) (0.99). Interestingly, the results indicated that pro-environmental values had a negative, weak effect on intended birdwatching behaviour (BehInt2) (-0.14).

Considering the relationship between intended pro-environmental and avi-behaviour (BehInt1) on actual pro-environmental and avi-behaviour (Actual behaviour1) and actual birdwatching behaviour (Actual behaviour2), the structural path estimates were statistically significant. These results indicated that intended pro-environmental and avi-behaviour had a positive relationship with actual pro-environmental and avi-behaviour (0.22) and a positive, but weak effect on actual birdwatching behaviour (0.07).

Regarding the relationship between intended birdwatching behaviour (BehInt2) on actual pro-environmental and avi-behaviour (Actual behaviour1) and actual birdwatching behaviour (Actual behaviour2), the structural path estimates were statistically significant, and the standardised regression coefficients were 0.50, and 0.59 respectively. These results indicated that a strong relationship exists between intended birdwatching behaviour and both actual pro-environmental and avi-behaviour (0.50) and actual birdwatching behaviour (0.59). However, as expected, the relationship between intended birdwatching behaviour and actual birdwatching behaviour was the stronger relationship (0.59).

Therefore, the relationships indicated in the final SEM model (Figure 6.17) was interpreted and also represented the research hypothesis that was set for building block 3. Based on the outcome of the final SEM model, the hypotheses that were set in building block 3, as outlined in Table 4.14 (see section 4.8.4), were evaluated. When the relationship was statistically significant, the null hypothesis was rejected

(Saunders *et al*., 2016:537). Table 6.28 provides the results of the structural model hypotheses ($H_{03,\ 07}$–H_{034}).

Table 6.28: Results of the structural model hypotheses of the final model

Null hypotheses				Standardised regression weights	Outcome (Null hypotheses)
$H_{03,\ 07}$	Critical resources	<---	Avi-orientation	0.471	Rejected
$H_{04,\ 08}$	Enjoyment	<---	Avi-orientation	0.874	Rejected
$H_{05,\ 09}$	PEV	<---	Avi-orientation	0.760	Rejected
$H_{06,\ 010}$	Utilisation	<---	Avi-orientation	0.074	Rejected
H_{011}	Critical resources	<---	Knowledge	Not significant	Not rejected
H_{012}	Enjoyment	<---	Knowledge	-0.035	Rejected
H_{013}	PEV	<---	Knowledge	0.111	Rejected
H_{014}	Utilisation	<---	Knowledge	-0.365	Rejected
H_{015}	Critical resources	<---	intaff	Not significant	Not rejected
H_{016}	Enjoyment	<---	intaff	0.054	Rejected
H_{017}	PEV	<---	intaff	0.034	Rejected
H_{018}	Utilisation	<---	intaff	-0.141	Rejected
H_{019}	Critical resources	<---	intaware	Not significant	Not rejected
H_{020}	Enjoyment	<---	intaware	0.028	Rejected
H_{021}	PEV	<---	intaware	Not significant	Not rejected
H_{022}	Utilisation	<---	intaware	Not significant	Not rejected
H_{023}	BehInt1	<---	Critical resources	0.140	Rejected
H_{024}	BehInt1	<---	Enjoyment	0.717	Rejected
H_{025}	BehInt1	<---	PEV	0.096	Rejected
H_{026}	BehInt1	<---	Utilisation	-0.063	Rejected
H_{027}	BehInt2	<---	Critical resources	Not significant	Not rejected
H_{028}	BehInt2	<---	Enjoyment	0.992	Rejected
H_{029}	BehInt2	<---	PEV	-0.137	Rejected
H_{030}	BehInt2	<---	Utilisation	Not significant	Not rejected
H_{031}	Actual behaviour1	<---	BehInt1	0.215	Rejected
H_{032}	Actual behaviour2	<---	BehInt1	0.070	Rejected
H_{033}	Actual behaviour1	<---	BehInt2	0.495	Rejected
H_{034}	Actual behaviour2	<---	BehInt2	0.590	Rejected

The results reported in Table 6.28 provided the outcome of the null-hypothesis for the final model. The main findings regarding structural model hypotheses of the final model are summarised below.

- The relationship of avi-orientation with critical resources, enjoyment, pro-environmental values and utilisation, the structural path estimates were statistically significant. The null hypothesis regarding the relationships between 'avi-orientation' and 'environmental and avi-values' ($H_{03,07}$–$H_{06,010}$) were consequently rejected.
  - $H_{3,7}$: Avi-orientation is related to critical resources
  - $H_{4,8}$: Avi-orientation is related to enjoyment
  - $H_{5,9}$: Avi-orientation is related to pro-environmental values
  - $H_{6,10}$: Avi-orientation is related to utilisation
- The effect of knowledge on enjoyment, pro-environmental values and on utilisation, the structural path estimates were statistically significant. Consequently, the hypothesis regarding the relationships between 'knowledge' and 'environmental and avi-values', the null hypotheses for H_{012}–H_{014} were rejected.
  - H_{011}: Knowledge is not related to critical resources
  - H_{12}: Knowledge is related to enjoyment
  - H_{13}: Knowledge is related to pro-environmental values
  - H_{14}: Knowledge is related to utilisation
- The interaction effect between knowledge and avi-affinity with enjoyment, pro-environmental values and utilisation, the structural path estimates were statistically significant. The null hypotheses regarding the relationships between 'avi-orientation' and 'environmental and avi-values' (H_{016}–H_{018}) were consequently rejected.
  - H_{015}: The interaction effect between knowledge and avi-affinity does not have an effect on critical resources
  - H_{16}: The interaction effect between knowledge and avi-affinity has an effect on enjoyment

- H_{17}: The interaction effect between knowledge and avi-affinity has an effect on pro-environmental values
- H_{18}: The interaction effect between knowledge and avi-affinity has an effect on utilisation

- Regarding the interaction effect between knowledge and avi-awareness with enjoyment, the structural path estimates were statistically significant. Consequently, the null hypothesis for H_{020} was rejected.
  - H_{019}: The interaction effect between knowledge and avi-awareness does not have an effect on critical resources
  - H_{20}: The interaction effect between knowledge and avi-awareness has an effect on enjoyment
  - H_{021}: The interaction effect between knowledge and avi-awareness does not have an effect on pro-environmental values
  - H_{022}: The interaction effect between knowledge and avi-awareness does not have an effect on utilisation

- Regarding the effect of critical resources, enjoyment, pro-environmental values and utilisation on intended pro-environmental and avi-behaviour (BehInt1), the structural path estimates were statistically significant. The null hypotheses regarding the relationships between 'environmental and avi-values' and intended pro-environmental and avi-behaviour (BehInt1) (H_{023}–H_{026}) were thus rejected:
  - H_{23}: Critical resources are related to intended pro-environmental and avi-behaviour
  - H_{24}: Enjoyment is related to intended pro-environmental and avi-behaviour
  - H_{25}: Pro-environmental values are related to intended pro-environmental and avi-behaviour
  - H_{26}: Utilisation is related to intended pro-environmental and avi-behaviour

- Also the effect of enjoyment and pro-environmental values on intended birdwatching behaviour (BehInt2), the structural path estimates were statistically significant. The null hypotheses regarding the relationships between ‘environmental and avi-values’ and intended birdwatching behaviour (BehInt2) (H_{28}–H_{29}) were therefore rejected:

- H_{027}: Critical resources is not related intended birdwatching behaviour
- H_{28}: Enjoyment is related to intended birdwatching behaviour
- H_{29}: Pro-environmental values is related to intended birdwatching behaviour
- H_{030}: Utilisation is not related to intended birdwatching behaviour

- The relationship between intended pro-environmental and avi-behaviour (BehInt1) on actual pro-environmental and avi-behaviour (Actual behaviour1) and actual birdwatching behaviour (Actual behaviour2), the structural path estimates were statistically significant. The null hypotheses (H_{031} and H_{032}) were consequently rejected:
  - H_{31}: Intended pro-environmental and avi-behaviour is related to actual pro-environmental and avi-behaviour
  - H_{32}: Intended pro-environmental and avi-behaviour is related to actual birdwatching behaviour
- Regarding the relationship between intended birdwatching behaviour (BehInt2) on actual pro-environmental and avi-behaviour (Actual behaviour1) and actual birdwatching behaviour (Actual behaviour2), the structural path estimates were statistically significant and the null hypotheses (H_{033}–H_{034}) were subsequently rejected.
  - H_{33}: Intended birdwatching behaviour is related to actual pro-environmental and avi-behaviour
  - H_{34}: Intended birdwatching behaviour is related to actual birdwatching behaviour

The role of involvement was also explored in the full SEM model and the results thereof are presented next.

6.7 RESULTS OF SEM: THE ROLE OF INVOLVEMENT IN THE FULL SEM MODEL

This study used involvement[59] to investigate the participation of secondary school learners in birdwatching and avitourism (see Annexure A: Questionnaire, Section B2). In this section, the possibility that involvement of secondary school learners in birdwatching could play a role in the model for sustainable avitourism was explored. This links to the last of the secondary objectives of the study, namely, to explore the role of involvement (in birding and avitourism) in the model for sustainable avitourism.

In the previous section, the results of the final model for sustainable avitourism were discussed. To further the study, the role that involvement potentially plays in the structural path of the final model for sustainable avitourism, five scenarios were explored. Five subsequent SEM models were tested to determine where involvement fits best in the final model (see Figure 6.3, Role of involvement in the full SEM model). The structural path diagrams of the five models were presented first and thereafter the model fit statistics for each model. In the first SEM model, the observed variable involvement was included between the avi-orientation and the calculated knowledge variable (moderating variable); and environmental and avi-values as indicated in Figure 6.18.

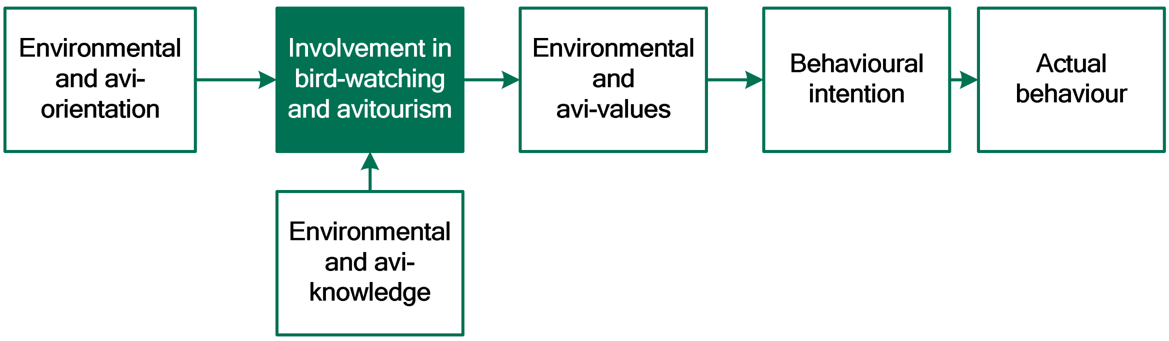

Figure 6.18: SEM model 1: Involvement between environmental and avi-orientation, environmental and avi-knowledge and environmental and avi-values

[59] Involvement refers to the level of perceived personal importance and/or interest evoked by a stimulus (or stimuli) within a specific situation (Antil, 1984:204; Kotler & Keller, 2009:214).

In the second SEM model, the observed variable, involvement, was included in between the environmental and avi-values and behavioural intention constructs, as indicated in Figure 6.19.

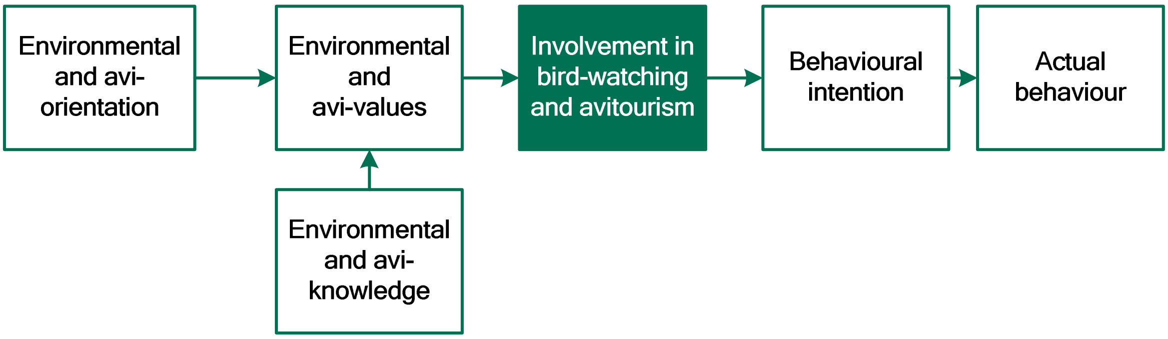

Figure 6.19: SEM model 2: Involvement between environmental and avi-values and behavioural intention

Thirdly, the observed variable involvement was tested between the behavioural intention and actual behaviour constructs. The path diagram is illustrated in Figure 6.20.

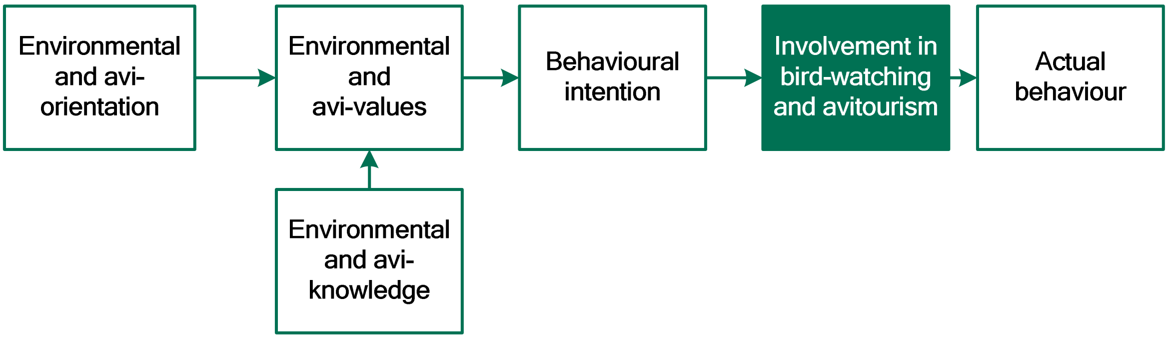

Figure 6.20: SEM model 3: Involvement between the behavioural intention and actual pro-environmental and avi-behaviour

The observed variable, involvement was then placed in a dependence relationship at the end, alongside the actual behaviour construct.

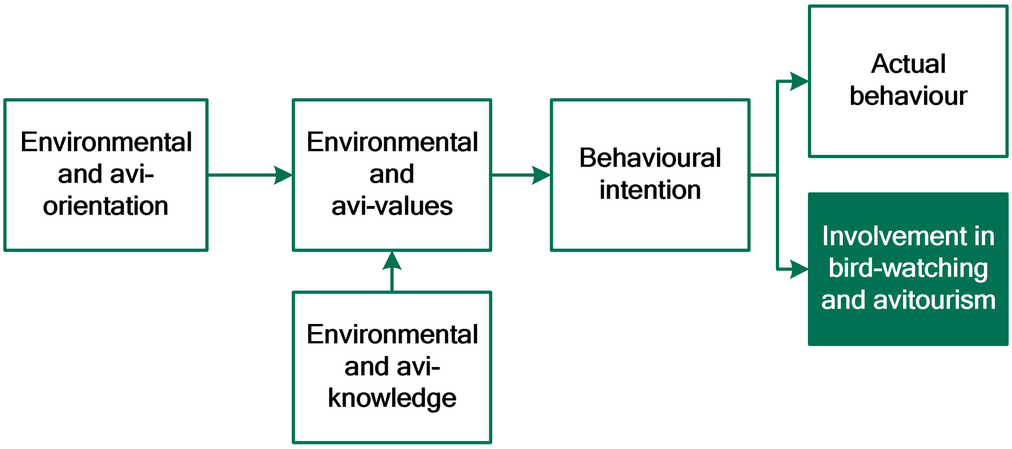

Figure 6.21: SEM model 4: Involvement placed at the end together with actual behaviour

Lastly, involvement was placed at the end, after the actual pro-environmental and avi-behaviour construct. Therefore, a dependence relationship was included in the model between ‘actual behaviour’ and ‘involvement’ as illustrated in Figure 6.21, Involvement SEM model 5.

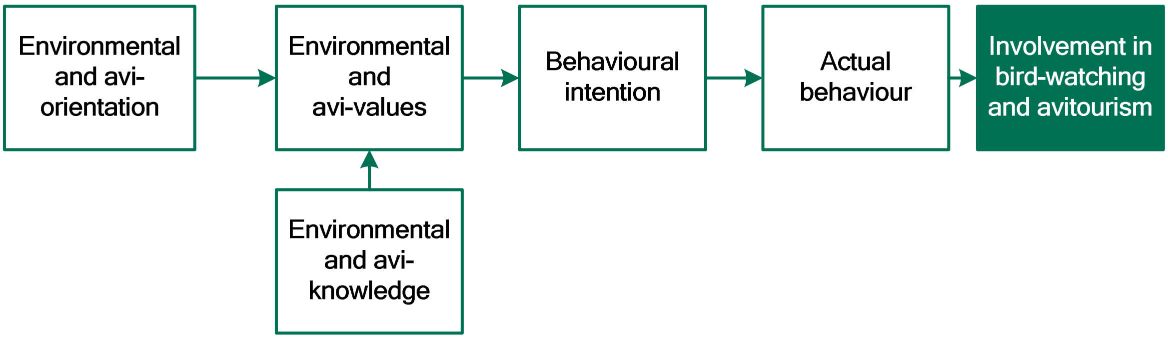

Figure 6.22: SEM model 5: Involvement placed at the end as an outcome of the process

The five SEM models were evaluated by goodness-of-fit indices to determine which one of the proposed models emulates the sample matrix best. Table 6.29 provides the goodness-of-fit indices of the five SEM models.

Table 6.29: Goodness-of-fit indices: SEM models including involvement

Model	CMIN (X^2)	df	p	CMIN/df	RMSEA	CFI	TLI	IFI
Model 1: Involvement between avi-orientation, knowledge and values	33568.939	1689	0.000	19.875	0.059	0.804	0.795	0.804

Model 2: Involvement between values and behavioural intention	33732.733	1683	0.000	20.043	0.059	0.803	0.793	0.803
Model 3: Involvement between behavioural intention and actual behaviour	29687.616	1681	0.000	17.661	0.055	0.828	0.819	0.828
Model 4: Involvement together with actual behaviour	27763.986	1679	0.000	16.536	0.055	0.840	0.831	0.840
Model 5: Involvement placed at the end of the SEM model	27734.335	1679	0.000	16.518	0.053	0.840	0.831	0.840
Indicate acceptable fit	-	-	-	<3	≤ 0.08	≥ 0.90	≥ 0.90	≥ 0.90

When the five structural models were fitted to the data, the models did not show acceptable model fit.

In SEM Model 1 (Involvement between avi-orientation and knowledge) the goodness of fit indices indicated an acceptable RMSEA value (0.059), with the lower and upper 90% confidence interval ranging between 0.058 and 0.059. However, CFI (0.804), TLI (0.795) and IFI (0.804) were below 0.90, which did not indicate an acceptable model fit.

In SEM Model 2 (Involvement between environmental and avi-values, and behavioural intentions), the RMSEA value (0.059), with the lower and upper 90% confidence interval ranging between 0.058 and 0.059, indicated an acceptable model fit. However, the CFI (0.803), TLI (0.793) and IFI (0.803) values did not show an acceptable fit.

When SEM Model 3 (Involvement between behavioural intentions and actual pro-environmental and avi-behaviour) was fitted to the data, the RMSEA (0.055), with the lower and upper 90% confidence interval ranging between 0.055 and 0.056, indicated acceptable model fit. Although, the CFI (0.828), TLI (0.819) and IFI (0.828) values should have been above 0.90 for an acceptable fit, the values were below 0.90, and therefore did not show an acceptable fit.

In SEM Model 4 (Involvement at the end, together with actual behaviour), the RMSEA (0.053), indicated an acceptable model fit. However, the CFI (0.840), TLI (0.831) and IFI (0.840) were below 0.90 which did not indicate an acceptable fit.

Lastly in SEM Model 5 (Involvement placed at the end of the SEM model, after actual pro-environmental and avi-behaviour), the RMSEA (0.053), with the lower and upper 90% confidence interval ranging between 0.053 and 0.054, indicated an acceptable model fit. However, the CFI (0.840), TLI (0.831) and IFI (0.840) were below 0.90 which did not indicate an acceptable model fit.

When all these fit indices were considered, the five SEM models presented an unsatisfactory fit with the observed data. However, when the five models were compared, based on the results obtained from the five scenarios, Model 5 presented the best model fit, since the chi^2 values were lower than the other models. Also, the CFI, TLI and IFI values in Model 5 were closer to 0.90 compared to the values in Models 1 to 4. It could therefore be concluded that involvement played the strongest role when placed at the end of the SEM model, after actual pro-environmental and avi-behaviour. These results indicate that the involvement of secondary school learners in birdwatching and avitourism would most probably occur if learners have or acquire the following:

- Positive environmental and avi-orientation
- Knowledge of bird and the environment
- Positive value systems regarding birds and the natural environment
- The intent to act pro-environmentally for the sustainability of birds and the natural environment
- Actual pro-environmental and avi-behaviour.

6.8 CONCLUSION

The results of the present study was arranged according to three stages. The descriptive statistics (stage 1) and factor analysis (stage 2) were presented in Chapter 5. The analysis of sustainable avitourism data and discussion of SEM results (stage 3) were presented in this chapter (see Figure 5.1). Chapter 6 therefore linked to the fifth secondary objective of this study, namely –

> To test the conceptual literacy framework empirically for sustainable avitourism though structural equation modelling (SEM).

The structure of this chapter was outlined in Figure 6.3. The flow process assisted in presenting the results of stepwise process leading to the final SEM model.

The stepwise process (see Figure 6.2) was used to gain more insight into the relationships within and across each of the three building blocks of the model:

- Building block 1: The SEM model represented the relationships between avi-affinity and avi-awareness; knowledge. Both hypotheses indicated that avi-affinity and knowledge (β = 0.082) and avi-awareness and knowledge (β = 0.166) had a positive, but weak effect on knowledge (see section 6.2).
- Building block 2: The SEM model represented the relationships between avi-affinity and avi-awareness; knowledge and avi-values. The results indicated that a moderating effect only exists between knowledge and avi-affinity with enjoyment (H_{16}) and between knowledge and avi-awareness with enjoyment (H_{20}) (see section 6.3).
- Building block 3: The full SEM model with respect to the relationships between avi-affinity, avi-awareness, bird and environmental knowledge, environmental and avi-values, behavioural intentions and actual behaviour. Although model 2 provides an improvement over Model 1 in terms of the standardised regression coefficients that were interpretable and the RMSEA value which indicated a good fit (0.053), the CFI, TLI and CFI values were slightly below 0.90 and therefore not ideal for interpretation. Therefore, two options to improve model fit were explored. Firstly, modification indices were considered and secondly, the role of the involvement was explored in the proposed model (see section 6.4).

The stepwise process described above lead to the development of the final SEM model (see section 6.6). The SEM model with additional covariances offered the best model fit (see Figure 6.17). The additional covariance relationships could be as a consequence of items that were adapted to the context of this study and also new items that were added in the questionnaire.

Finally the possible role that involvement of secondary school learners in birdwatching could play in the model for sustainable avitourism was tested by applying SEM (see section 6.7). This section related to the last secondary objective:

> To explore the role of behavioural involvement (in birding and avitourism) of secondary school learners in the literacy model for sustainable avitourism.

The results indicated that involvement played the strongest role when placed at the end of the full SEM model, after actual pro-environmental and avi-behaviour.

The conclusions and recommendations for environmental education and avitourism role-players, limitations of the study and recommendations for future research are discussed in Chapter 7.

CHAPTER 7: CONCLUSIONS AND RECOMMENDATIONS FOR ENHANCING ENVIRONMENTAL AND AVITOURISM LITERACY AMONG SECONDARY SCHOOL LEARNERS

7.1 OVERVIEW OF THE RESEARCH PROCESS

The celebration of the 2017 International Year of Sustainable Tourism for Development highlighted not only the enormous potential of tourism to contribute to the development of all countries within the framework of the Sustainable Development Goals (SDGs), but also the need to continue advancing towards a more sustainable sector that generates benefits to local communities and promotes the conservation of cultural values and natural heritage (UN-WTO, 2017a). Avitourism is recognised as a sustainable form of tourism with economic, social, and conservation value and significant growth potential. However, the sustainability of avitourism is dependent upon the natural resource base, specifically birds and their native habitat. Consequently, to realise the potential of sustainable avitourism in South Africa, now and in the future, protection and conservation of birds and their natural habitat are imperative.

The potential of avitourism to contribute significantly to sustainable growth in South Africa is adversely affected by incessant environmental degradation and biodiversity loss. It is of great concern that the numbers of certain bird species, playing an integral role in biodiversity, are decreasing at a rapid rate in all parts of the world. Hence, sustainable resource utilisation must be promoted to ensure that natural resources (birds and their natural habitat), on which avitourism depends, are kept intact and further enhance positive birding experiences for avitourists.

As a response to the current sustainability crisis, education has been earmarked as our best hope for solving environmental problems (De Beer *et al.*, 2017:23; Saylan & Blumstein, 2011:157; Urry, 2011:132; Van As *et al.*, 2012:412; Wheeler, 2012:123). The importance of environmental education strategies for encouraging changes in values, mind-sets, and behaviour regarding sustainability problems relating to environmental degradation has been highlighted. Changing environmental behaviours such as recycling, littering, and energy use, and encouraging environmental citizenship, require active participation of citizens and a firm understanding of what works in terms of educational programmes or interventions aimed at behavioural change (Goodwin *et al*., 2010). The enhancement of environmental attitudes and behaviour of young people has been identified as an approach to promote pro-environmentalism over the long-term (Goodwin *et al.,* 2010). As current-day learners will have a major influence on the future state of the natural environment (including birds and bird habitat), innovative ways of interactive learning about environmental sustainability and engagement at school level are highly relevant.

Thus, the purpose of the research was firstly to gain an understanding of the current level of environmental and avitourism literacy among secondary school learners, and secondly to development a model for enhancing environmental and avitourism literacy. This could facilitate behavioural change in secondary school learners to became responsible future tourists or travellers and enhance sustainable avitourism ultimately. Furthermore, information gained could provide useful insight to key role-players in conservation, environmental education, and avitourism. The research findings and recommendations may thus complement and enhance sustainable avitourism in South Africa.

To address the purpose of the research an overview of the study process followed are summarised and presented in a flow diagram in Figure 7.1.

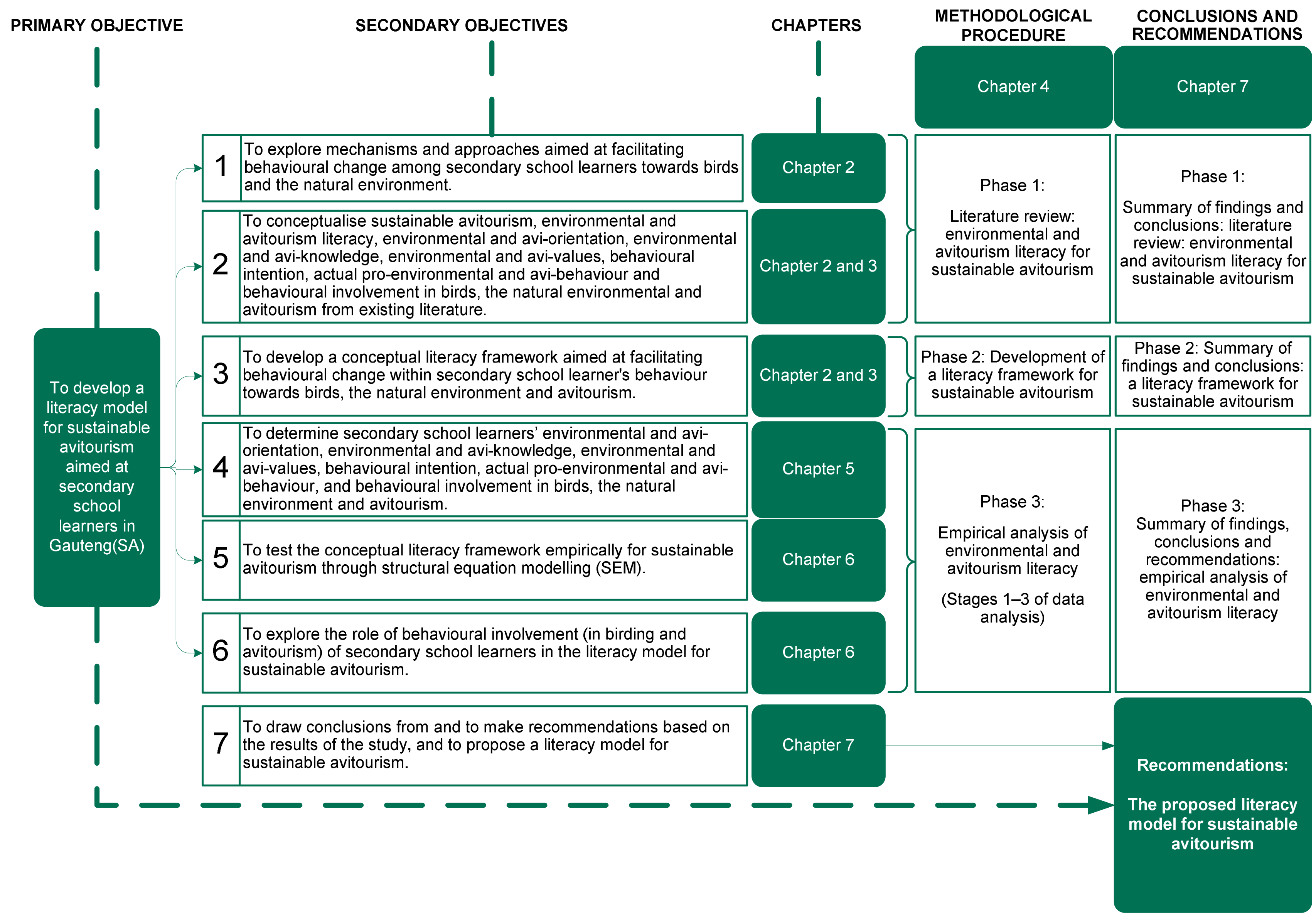

Figure 7.1: Overview of the study process

As illustrated in Figure 7.1, the primary objective of the study was to develop a literacy model for sustainable avitourism. To achieve this objective, seven secondary objectives were formulated and operationalised by the methodological procedure applied in this study.

The methodological procedure (detailed in Chapter 4) was executed in three phases. In *phase 1*, a literature review was performed (see Chapter 2) and a variety of sources of information were used to explore mechanisms and approaches aimed at facilitating behavioural change in secondary school learners regarding birds and the natural environment. This enabled the realisation of the first secondary research objective. Furthermore, existing literature from the environmental education and environmental literacy domains was consulted to conceptualise the six components applied in this study, namely avi-orientation, bird and environmental knowledge, environmental and avi-values, behavioural intention, actual pro-environmental and avi-behaviour, and behavioural involvement in the birding and avitourism, which achieved the second secondary research objective.

In *phase 2*, the third secondary research objective was achieved by the development of a conceptual literacy framework aimed at facilitating behavioural change within secondary school learners' behaviour towards birds, bird habitat, and avitourism, based on the literature review performed in *phase 1*. The developed conceptual framework for sustainable avitourism is presented and discussed in Chapter 3 (see Figure 3.1) and contributed to the body of knowledge in the tourism management field.

Phase 3 of the study was of an empirical nature. A survey was utilised to collect primary data. Data was obtained by n = 5 488 secondary school learners (aged 13 to 17 years) from 17 government-funded secondary schools in Gauteng, South Africa, during July to October 2014. The Gauteng Department of Education (GDE) granted permission to distribute questionnaires to four school districts, predominantly located in Johannesburg and Pretoria. A purposive sample was drawn for the study, based on specific criteria (section 4.3.3). This method was considered the most economical, convenient, and relevant sampling technique, as it suited the requirements for the selection of secondary schools in Gauteng for gaining access to the target population, namely secondary school learners (Grade 8, 9 and 10) in Gauteng. Structured questionnaires were distributed amongst secondary school learners to obtain data on the following seven key areas:

1. biographic information;
2. avi-orientation;
3. bird and environmental knowledge;
4. environmental and avi-values;
5. behavioural intention towards birds and the natural environment;
6. actual pro-environmental and avi-behaviour; and
7. behavioural involvement in birdwatching and avitourism.

The data were analysed using descriptive statistics and multivariate statistical methods, namely exploratory factor analysis (EFA), confirmatory factor analysis (CFA), and structural equation modelling (SEM) (see Figure 5.1). The descriptive statistics (see Chapter 5, sections 5.2–5.3) provided information on the demographic profile and the current environmental and avitourism literacy of secondary school learners, describing each of the six components, which realised the fourth secondary objective. SEM was applied in a sequential order to determine the directional relationships between the five constructs/variables used in this study as the building blocks to produce the final SEM model (see Figure 6.3). The fifth secondary research objective was achieved when the conceptual literacy framework for sustainable avitourism was tested empirically, which resulted in the final model (see Figure 6.17). Furthermore, the role of behavioural involvement (in birding and avitourism) of secondary school learners in the model for sustainable avitourism was explored, which achieved secondary objective 6 (section 6.7). Finally, in this chapter, conclusions are drawn and recommendations are made based on the results of the study, achieving secondary objective 7, in that a literacy model for sustainable avitourism is proposed.

The outline of chapter 7 is illustrated in Figure 7.2.

7.1 OVERVIEW OF THE STUDY PROCESS

7.2 PHASE 1: SUMMARY OF FINDINGS AND CONCLUSIONS: LITERATURE REVIEW: ENVIRONMENTAL AND AVITOURISM LITERACY FOR SUSTAINABLE AVITOURISM

7.2.1 Conceptualisation of sustainable avitourism
7.2.2 Conceptualisation of environmental and avitourism literacy
7.2.3 Models relating to environmental literacy and environmental behaviour

7.3 PHASE 2: SUMMARY OF FINDINGS AND CONCLUSIONS: A LITERACY FRAMEWORK FOR SUSTAINABLE AVITOURISM

7.4 PHASE 3: SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATIONS: EMPIRICAL ANALYSIS OF ENVIRONMENTAL AND AVITOURISM LITERACY- DESCRIPTIVE STATISTICS AND FACTOR ANALYSIS

7.4.1 Biographic information of respondents at secondary schools in Gauteng
7.4.2 Avi-orientation of secondary school learners towards birds and the natural environment
7.4.3 Environmental and avi-knowledge of secondary school learners
7.4.4 Environmental and avi-values of secondary school learners
7.4.5 Behavioural intention of secondary school learners towards birds and the natural environment
7.4.6 Actual pro-environmental behaviour of secondary school learners towards birds and the natural environment
7.4.7 Behavioural involvement of secondary school learners in birding and avi-tourism

7.5 PHASE 3: SUMMARY OF RESULTS AND CONCLUSIONS: STRUCTURAL EQUATION MODELLING (SEM)

7.5.1 Summary of results and conclusions: Stepwise process
7.5.2 Summary of results and conclusions: Final SEM model

7.6 RECOMMENDATIONS:
THE PROPOSED LITERACY MODEL FOR SUSTAINABLE AVITOURISM

7.6.1 Target group: Who should be educated
7.6.2 Framework for behavioural change: What should be the focus of the environmental and avitourism education
7.6.3 Outcome: Sustainable avitourism

7.7 LIMITATIONS OF THE STUDY

7.8 RECOMMENDATIONS FOR FUTURE RESEARCH

7.9 CONCLUSION

Figure 7.2: Flow diagram of chapter 7

The summary of findings and conclusions of each phase will be discussed in the following sections.

7.2 PHASE 1: SUMMARY OF FINDINGS AND CONCLUSIONS: LITERATURE REVIEW – ENVIRONMENTAL AND AVITOURISM LITERACY FOR SUSTAINABLE AVITOURISM: TOWARDS A CONCEPTUAL FRAMEWORK

In *phase 1* the body of knowledge on sustainable avitourism, as well as mechanisms and approaches that were identified to facilitate behavioural change towards birds and the natural environment, was outlined (Chapter 2). This links to the first and second secondary objectives of the current study. In this section the main findings and conclusions from the literature review on sustainable avitourism and environmental and avitourism literacy are summarised.

7.2.1 Conceptualisation of sustainable avitourism

Avitourism, a niche market in tourism, was discussed as a growth area and trend in tourism and was identified as forming part of nature-based tourism, ecotourism, and wildlife watching tourism. Based on the literature review (section 2.3.1), sustainable avitourism was defined as:

> An activity of observing, identifying and enjoying birds in their native habitats where the birder needs to take a trip away from home for the primary purpose of observing birds. Furthermore, it is a niche tourism market (both domestic and international) and component or sub-category of nature-based, eco- and wildlife watching tourism that is focused specifically on birds and birdwatching as an activity. Avitourism also takes full account of its current and future economic, social and environmental impacts, addressing the needs of avitourists, the avitourism industry, the environment, and host communities. Lastly, avitourism excludes bird hunting and backyard birding, where the birder merely watches birds around the home, noticing birds while mowing the lawn or picnicking at the beach, or through trips to zoos or the observation of captive birds.

As sustainable tourism development principles, guidelines, and management practices are applicable to all forms of tourism, including avitourism, the relationship of avitourism and sustainability was highlighted in the literature review (section 2.3.2).

The three key pillars that support the triple bottom line approach to sustainable avitourism were highlighted in the literature review, namely –

- economic sustainability (e.g. foreign exchange earnings from money spent on birding trips, government income taxes, and employment generation);
- social sustainability (e.g. stimulation of regional and rural development, alternative sources of income and employment of local communities, local communities gaining a greater awareness of conservation of the natural and cultural resources, thus integrating conservation and rural development); and
- environmental sustainability (e.g. local awareness of the values of biodiversity and the conservation of natural resources and bird species, and providing high-quality visitor experience and ensuring good visitor behaviour).

Equal weighting of each pillar can be equated with equilibrium, meaning that a suitable balance should be established between the three pillars to guarantee long-term sustainability.

Furthermore, various avitourism stakeholders were identified in the literature review, and their role in the sustainability of avitourism was emphasised (section 2.3.3). Stakeholders in sustainable avitourism include indigenous and local communities, the youth, wildlife managers in the public and private sectors, conservation NGOs, national and local government, birding tour operators, local birding operators and excursion providers, the accommodation sector, avitourists, and environmental education groups.

The sustainability of avitourism depends on the natural resource base, namely birds and bird habitat. However, the numbers of certain species are decreasing at a rapid rate in all parts of the world. Thus, the key role of education that promotes changes in values, mind-sets, and behaviour regarding sustainability problems relating to environmental degradation was also highlighted in the literature review.

From the environmental education and environmental literacy domains, environmental literacy was identified as an approach to promote pro-environmentalism over the long-term to improve the environmental attitudes and behaviour of secondary school learners.

7.2.2 Conceptualisation of 'environmental and avitourism literacy'

The literature review highlighted the potential of environmental literacy as a vehicle to realise the educational agenda of sustainable development. The concept 'environmental literacy' was adapted for the present study, focusing specifically on birds, the natural environment, and avitourism, thus contributing on a theoretical level. Based on secondary literature, a definition for 'environmental and avitourism literacy' was developed (section 2.4.2). For the purpose of this study, 'environmental and avitourism literacy' was defined as:

> An individual's awareness and affinity, knowledge, values, behavioural intention and actual pro-environmental behaviour towards birds, the natural environment, and sustainable avitourism (or birdwatching), to protect birds and improve the natural habitat of birds in which birds live for the present and future generations.

Furthermore, the categories and components of environmental and avitourism literacy were discussed (section 2.4.3). An evaluation of the literature assisted in identify the underlying categories and components of environmental and avitourism literacy. The literature review further provided evidence to support the selection, definition, and measurement of the environmental and avitourism literacy components included in the present study. They are environmental and avi-orientation (awareness – cognitive, affinity – affective); environmental and avi-knowledge (cognitive); environmental and avi-values (affective); behavioural intention (affective); and actual pro-environmental and avi-behaviour (action).

The literature review (section 2.5) highlighted pro-environmental behaviour as the ultimate expression of environmental literacy. The related models are summarised next.

7.2.3 Models relating to environmental literacy and pro-environmental behaviour

Building upon the definitions and theory on environmental and avitourism literacy, six models relating to environmental literacy and pro-environmental behaviour were discussed, indicating the development of theory in this field (section 2.5). The following models were considered in developing the conceptual literacy framework for sustainable avitourism:

- The theory of planned behaviour (Ajzen, 1985) considers behavioural intention as central to understanding pro-environmental behaviour. The current study has therefore incorporated behavioural intention in the conceptual literacy framework for sustainable avitourism (section 2.5.3).
- The environmental literacy variables used in existing environmental behaviour models (Hines *et al*., 1987; Hungerford & Volk, 1990) and the environmental literacy frameworks (Hungerford & Tomera, 1985; Marcinkowski & Rehring, 1995;) were examined and considered in the development of the conceptual framework of the present study (section 2.5).

Based on the literature review presented in Chapter 2, a conceptual literacy framework for the current study, focusing specifically on birds, the natural environment, and avitourism, was developed (see Figure 3.1). The next section presents the conceptual literacy framework for sustainable avitourism and summaries its components.

7.3 PHASE 2: SUMMARY OF FINDINGS AND CONCLUSIONS: CONCEPTUAL LITERACY FRAMEWORK FOR SUSTAINABLE AVITOURISM

In *phase 2*, based on the literature review, a conceptual literacy framework for sustainable avitourism, aimed at facilitating behavioural change within secondary school learners' behaviour towards birds, the natural environment, and avitourism was developed (Chapter 3). This section relates to the third secondary objective of the study: to develop a conceptual literacy framework aimed at facilitating behavioural change within secondary school learners' behaviour towards birds, the natural environment and avitourism. The components of this framework were also conceptualised, linking with the second secondary objective of this study: to conceptualise environmental and avitourism literacy, avi-orientation, bird and environmental knowledge, environmental and avi-values, behavioural intention, and pro-environmental and avi-behaviour from existing literature. The conceptual literacy framework for sustainable avitourism, which includes the responsible future tourist of tommowow, is presented in Figure 7.3.

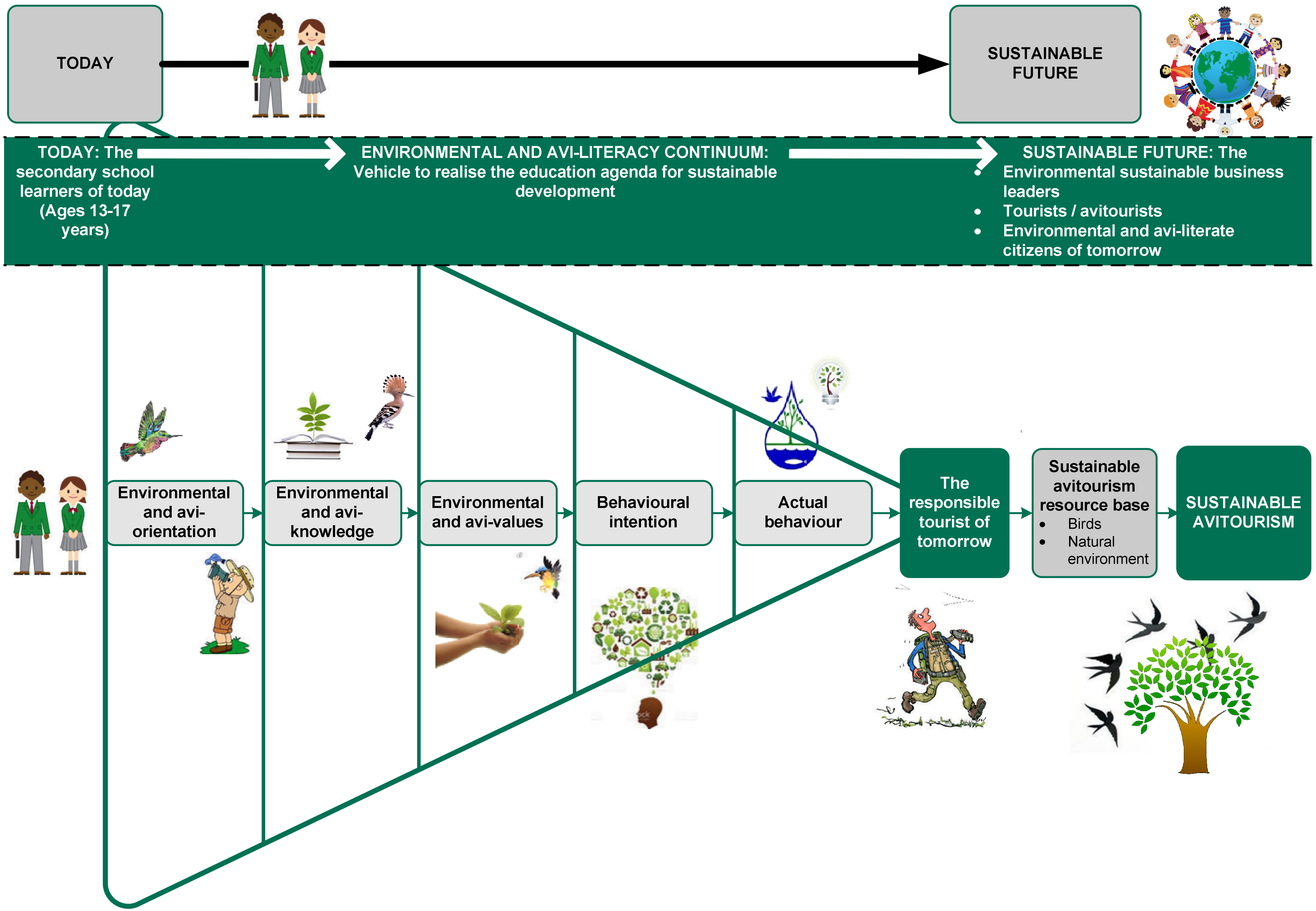

Figure 7.3: Conceptual literacy framework for sustainable avitourism and the responsible future tourist of tommorow

Figure 7.3 illustrates the components of the environmental and avitourism literacy continuum, borrowed from the environmental education and environmental literacy domains. Five components were adapted for the current study, namely 'environmental and avi-orientation', 'bird and environmental knowledge', 'environmental and avi-values', 'behavioural intention', and 'actual behaviour towards birds and the natural environment'. Collectively, these components were described as 'environmental and avitourism literacy'.

While a detailed discussion of each component of the conceptual framework was provided in Chapter 3 (achieving secondary objective 2), a short definition of each component, for the purpose of the current study, is provided here:

- 'Environmental and avi-orientation' refers to the way in which one perceives the natural world, reflected in one's general impression, consciousness about the importance, and personal interest in birds, and the natural environment in which birds live.
- 'Environmental and avi-knowledge' refers to one's knowledge and ability to understand and evaluate the facts, information and principles relating to the sustainability of birds and the natural habitat in which birds live, the causes of environmental problems affecting birds and bird habitat, and possible social solutions to these environmental problems.
- 'Environmental and avi-values' is defined as deeply rooted, abstract motivations that guide, justify, or explain one's attitudes, norms, opinions, and actions regarding birds and the natural environment.
- 'Behavioural intention' towards birds, the natural environment, and avitourism is defined as one's perceived likelihood or subjective probability to engage in actual pro-avi- and environmental behaviour, how hard one is willing to try, or how much effort one is planning to exert to perform a particular pro-environmental behaviour. Moreover, it involves one's affirmation or verbal commitment that one intends to perform environmentally sustainable behaviour towards birds and bird habitat in future.
- 'Actual behaviour' towards birds, the natural environment, and avitourism refers to behaviour that consciously seeks to minimise the negative impact of one's actions on the natural and built world (for example, minimise

resource and energy consumption that will support the existence of birds, and reduce waste production to protect and save birds).

The main idea or thinking regarding the conceptual literacy framework for sustainable avitourism was that the secondary school learner of today influences the future state of the natural environment. If learners could go through a process of education that would enhance pro-environmental and avi-behaviour then these changed behaviours would lead to the responsible citizens or tourists of tommow, the sustainability of birds and the natural environment, and ultimately sustainable avitourism. Thus indicating that '*the learner of today became the tourist of tommorow*'.

To investigate secondary school learners' current level of involvement in birding and avitourism, a sixth component (proxy variable), namely 'behavioural involvement' was added. For the purpose of this study, behavioural involvement was defined as the time and/or intensity of one's effort expended in pursuing the birding activity. The degree of involvement in birding can be conceived as a continuum ranging from high to low.

The next section outlines the conclusions and recommendations drawn from *phase 3*, the empirical analysis of environmental and avitourism literacy. Section 7.4 outlines the conclusions drawn for the descriptive statistics and the factors analysis, while a summary of the results and conclusions drawn from *SEM* are presented in section 7.5.

7.4 PHASE 3: CONCLUSIONS AND RECOMMENDATIONS: EMPIRICAL ANALYSIS OF ENVIRONMENTAL AND AVITOURISM LITERACY – DESCRIPTIVE STATISTICS AND FACTOR ANALYSIS

This section links to the achievement of the fourth of the secondary objectives of the study, namely to determine secondary school learners' avi-orientation, behavioural involvement, bird and environmental knowledge, environmental and avi-values, behavioural intentions, and actual behaviour towards birds, the natural environment, and avitourism.

Firstly, a summary of the biographic information of respondents is provided. Then the item results from the descriptive statistics and factor analysis, the interpretation thereof, confirmation of the literature, and recommendations where applicable are discussed with respect to the six components (environmental and avi-orientation, bird and environmental knowledge, environmental and avi-values, behavioural intention, actual pro-environmental and avi-behaviour, and behavioural involvement), as applied in this study.

7.4.1 Biographic information of respondents at secondary schools in Gauteng

The results indicated that the sample distribution of participating schools in Gauteng was relatively equally distributed amongst the four school districts (23%, 20.7%, 26.5% and 29.7%).

To synthesise the biographic information (section 5.2), a relatively even gender ratio was observed, with a slight larger proportion of female (55.3%) learners. The age of the majority of the learners participating in the study ranged from 14 to 16 years. The home language of the majority of the participants was Afrikaans (42.1%), followed by African languages (37.7%) and English (18.8%). Regarding race, the majority of respondents were African (44.7%), followed by white (39.5%) and coloured (10.9%).

From this information it can be inferred that learners who completed the questionnaire characterised the target population identified for this study, namely secondary school learners in Grade 8, 9 and 10 (mostly 14 to 16 years) who attended various secondary schools in Gauteng during July to October in 2014.

The main descriptive (item results) and factor analysis results, conclusions, and recommendations for each of the six components (constructs) measured in this study are presented next.

7.4.2 Avi-orientation of secondary school learners towards birds and the natural environment

The avi-orientation measurement scale, consisting of two empirically identified distinct components, ‘avi-awareness’ and ‘avi-affinity’ (section 4.4), assisted in measuring ways in which secondary school learners perceive the natural world, in this case, birds and bird habitat specifically. An improved understanding of avi-orientation is necessary to identify education priorities that could eventually translate into actions/behaviour that will encourage the sustainability of birds and a sustainable avitourism industry.

The item results (section 5.3.1) with regard to avi-awareness displayed a high consciousness among secondary school learners about the importance and sustainability of birds and their natural habitat. However, overall avi-affinity of learners seems rather low and poses clear challenges to transforming the noteworthy emotional interest of secondary school learners. Evidently, environmental educators and avitourism role-players could improve learners' avi-orientation and their understanding of the value of birds and the natural environment.

From the EFA results on avi-orientation (section 5.4.1) two factors were identified, namely 'avi-awareness' and 'avi-affinity'. The learners' mean level of agreement towards the avi-affinity factor was neutral (3.0), while the learners' mean level of agreement towards the avi-awareness factor (4.2) tended to be at the agree level of the scale. Similar results were obtained by the study of Larson, Green and Castleberry (2011:81) on general environmental orientations of children in the USA (although younger, aged 6 to 13 years old), where eco-awareness was also scored higher than eco-affinity. Thus, the results indicate that the secondary school learners' general impression, or consciousness about the importance of the sustainability of birds and their habitat was fairly high (above 80% agreed/strongly agreed). Yet, learners' natural inclination, attraction or personal interest in birds and their natural habitat (overall avi-affinity) was neutral, indicating the need to transform the emotional interest (affective component) of learners towards birds and their habitat to a more active interest.

Outdoor activities have been linked to affective components and were found to be a key predictor of pro-environmental behaviour (Larson Green & Castleberry, 2011:84; Stevenson *et al.*, 2013). Encounters with nature, particularly those involving wildlife, can also have a strong emotional effect on people (Ballantyne & Packer, 2002). It is further argued that visiting informal educational settings, for example botanical gardens, museums, zoos, nature reserves, and environmental centres, can evoke feelings and arouse emotions regarding the natural environment (Adelman *et al*., 2000; Ballantyne & Packer, 2002; Falk & Dierking, 2000; Ham & Weiler, 2002;). School field trips to natural areas, such as nature reserves, will allow learners to engage emotionally with environmental issues (Ballantyne & Uzzell, 1999; Ballantyne *et al*., 2001).

Based on the results and conclusions on avi-orientation, the following is recommended to improve avi-affinity and further enhance avi-awareness:

- Environmental educators and avitourism role-players should create opportunities for learners to encounter and experience birdlife, and encourage learners to spend time outdoors and to visit informal educational settings (e.g. national zoological or botanical gardens).
- Secondary school principals and teachers should be encouraged to organise school field trips.
- Secondary school learners should be encouraged to –
  - read and learn more about birds, different bird species, and the natural environment in which birds live;
  - to attend bird-related events, for example, the annual bird fair that is held by BLSA (the local conservation and birding NGO in South Africa); and
  - undertake a bird tour in a national park or a nature reserve.

These results provided avi-education priorities (for example reading and learning about birds and to transform the emotional or affective component) that could promote positive avi-orientation and might lead to improved awareness and affinity of bird ecology and conservation of birds. This is of great interest to the avitourism industry, since the industry depends upon the natural resource base, in this case birds and bird habitat, as well as tourists with positive avi-orientation.

The results with respect to bird and environmental knowledge of secondary school learners are discussed in the next section.

7.4.3 Bird and environmental knowledge of secondary school learners

For secondary school learners (13 – 17 years) to make informed decisions about the sustainability of birds and their natural habitat, they must be equipped with a fundamental knowledge of birds and the natural environment as a whole. Increased knowledge about birds and the environment may raise learners' concerns about birds and their natural environment.

For the current study, a five-point multiple-choice answer approach was used and the answers on ten questions testing bird and environmental knowledge demonstrated the knowledge comprehension of secondary school learners regarding birds, bird habitat, and avitourism (section 5.3.3).

Considering the overall knowledge levels regarding birds and the natural environment, participating secondary school learners scored a knowledge comprehension mark of 37.47%, indicating low knowledge levels. These results are slightly lower when compared to the results of previous studies (Alp *et al*., 2006:214; Coyle, 2005:iv; Frick *et al*., 2004:1609; Haron *et al*., 2005:435; Levine & Strube, 2012:316; McBeth & Volk, 2010:61) conducted on general environmental knowledge. Learners' scores on environmental knowledge in North America (McBeth & Volk, 2010:61) and in Turkey (Alp *et al*., 2006:214), for example, revealed a relatively low to moderate ecological understanding.

That fact that learners did not show an adequate knowledge base to ensure the sustainability of birds and their natural habitat is reason for concern.

To improve bird and environmental knowledge of secondary school learners, the following is recommended:

- Environmental education programmes should include more information about birds and bird habitat.
- Environmental programmes should not only include basic knowledge of birds and bird habitat, but also knowledge regarding environmental problems affecting birdlife, the bird's role in the broader environmental system, action specific environmental knowledge (e.g. protecting and improving bird habitat, protecting indigenous trees where birds can breed and eat, and keeping rivers unpolluted).
- Environmental programmes should include information on conservation of birdlife and the sustainability of the natural resource base for future generations.

- Economic benefits of natural resources could also be highlighted in environmental education programmes (e.g. avitourism).

The main results, conclusions and recommendations regarding environmental and avi-values of secondary school learners are discussed in the next section.

7.4.4 Environmental and avi-values of secondary school learners

The two-dimensional model of ecological values (2-MEV model) was adapted for the current study (Bogner & Wiseman, 2006:253), measuring the preservation of birds and bird habitat versus the utilisation of the natural environment.

The item results on the preservation of birds and bird habitat (section 5.3.4) indicated clear concerns among learners regarding birdlife and the natural environment. These results are consistent with previous literature suggesting that learners have moderately positive or favourable attitudes towards the environment in general (Alp *et al*., 2006:215; Dunlap *et al*., 2000; McBeth & Volk, 2010:61). However, the learners' interest in and enjoyment of birds and the protection of bird habitat via responsible environmental behaviour, such as saving water and electricity, remains dismal. The results indicate that preservation values, linked to a selfless conserving and protecting of the natural environment (grounded in altruistic or biospheric values) (De Groot & Steg, 2009:1; Kaiser *et al*., 2007:243; Milfont & Duckitt, 2010:18), should be instilled in learners and consequently require educational support.

Regarding the item results on utilisation values (section 5.3.4), which describe the use of the natural environment with oneself as the core beneficiary (grounded in self-interest and egoistic values) (De Groot & Steg, 2009:1; Kaiser *et al*., 2007:243; Milfont & Duckitt, 2010:18), secondary school learners seem to have strong egoistic values and their self-interest seems important.

The EFA results revealed the presence of four components, which were labelled 'critical resources', 'enjoyment', 'pro-environmental values', and 'utilisation'. The learners' mean level of agreement to the pro-environmental values factor tended towards agreement (3.7), while their mean level of agreement was neutral toward the factors utilisation (2.79), enjoyment (3.20) and critical resources (3.35). These results indicate that the learners' pro-environmental values seem relatively strong, showing clear concerns among the learners regarding birdlife and the natural environment, for example living in harmony with nature to prevent the extinction of birds, setting aside areas to protect endangered bird species, and solving environmental problems affecting birds. However, the learners' level of agreement was neutral regarding the enjoyment of birds in their natural habitat and the protection of bird habitat via responsible environmental behaviour, such as saving critical resources (water and electricity). Of concern was also that learners' level of agreement was neutral about the statements demonstrating the utilisation of the natural environment. From these results, it can be concluded that environmental and avi-values have little significance to the majority of secondary school learners.

According to De Groot and Steg (2009:1), altruistic and biospheric values provide the most stable basis for pro-environmental behaviour. They suggest increasing the saliency of altruistic and biospheric values as a strategy to promote pro-environmental behaviour.

Therefore, to increase the environmental value sets of learners regarding birding and the natural habitat of birds, the following is recommended:

- Learners should be encouraged to spend time outdoors, since outdoor activities have been linked to affective components and were found to be a key predictor of pro-environmental behaviour (Stevenson *et al*., 2013).
- Altruistic and biospheric values should be strengthened, and at the same time conflict between egoistic versus altruistic and biospheric values should be decreased when designing interventions to promote sustainable pro-environmental behaviour (De Groot & Steg, 2009:5).

Conclusions with respect to behavioural intention of secondary school learners towards birds and the natural environment are discussed in the next section.

7.4.5 Behavioural intention of secondary school learners towards birds and the natural environment

This study measured learners' behavioural intention (i.e. learners' affirmation or verbal commitment that they intend to perform environmentally sustainable behaviour) towards birds and bird habitat in future. The measurement scale was adapted from the verbal commitment subscale of CHEAKS (Leeming *et al*., 1995) and new items were added.

The item results regarding behavioural intention indicated that, overall, learners showed a moderate to low intention to act pro-environmentally for the sustainability of birds (section 5.3.5). In fact, less than half of the learners were willing to save water and electricity, while even fewer learners were willing to recycle rubbish or to give up their own money to protect birds and bird habitat. These results were similar to the results of previous studies conducted on general pro-environmental behavioural intentions, indicating moderate behavioural intent; however, it seems that the results of the current study were slightly lower (McBeth & Volk, 2010:61). Moreover, less than half of the learners showed willingness to participate in birding activities and to join a bird club.

Furthermore, the EFA results (section 5.4.3) identified two factors that were subsequently labelled as ‘intended pro-environmental and avi-behaviour’ and ‘intended birdwatching behaviour’. The learners’ mean level of agreement towards the intended pro-environmental and avi-behaviour factor was neutral (3.0), while their mean level of agreement towards the intended birdwatching behaviour factor (2.87) was slightly below neutral. These results indicated average intention to act pro-environmentally for the sustainability of birds and below average for intended birdwatching behaviour among learners.

The following is recommended to enhance behavioural intention towards birds and the natural environment:

- Awareness, affinity, knowledge, and values toward birds and the natural environment should be raised amongst secondary school learners by including these components in the development of environmental programmes or interventions.

Conclusions regarding the actual pro-environmental behaviour of secondary school learners towards birds and the environment are discussed next.

7.4.6 Actual pro-environmental behaviour of secondary school learners towards birds and the natural environment

This study measured the actual pro-environmental behaviour of secondary school learners towards birds and the natural environment, using an adapted actual commitment subscale of CHEAKS (Leeming *et al*., 1995), and new items were added.

The item results (section 5.3.6) showed that secondary school learners are rather passive regarding the practice of positive sustainable behaviours (action component). Only a few learners have talked to teachers or parents about how to limit environmental problems that affect bird habitats. Moreover, secondary school learners showed a relatively low inclination to read about birds and their recycling behaviour. Interestingly, Mobley *et al*. (2009:17) noted that participants who reported higher levels of environmental reading reported higher levels of pro-environmental behaviour, and therefore suggests that reading can help increase engagement in pro-environmental behaviour. Secondary school learners' participation in birding activities was also rather low, since approximately half of the learners have never been on a birdwatching tour in a nature reserve, nor have they visited the local zoo or a museum to learn more about birds. From the results, it thus seems that not enough learners are exposed to opportunities to experience birds and the natural environment.

According to Nisbet, Zelenski and Murphy (2011:303), a disconnection from nature could contribute to an unhealthy environment and may have detrimental effects on human happiness. Moreover, learners from socially disadvantaged family backgrounds often live in an environment that lacks opportunities for frequent and diverse nature experiences. It follows that these learners tend to be deprived of the opportunity for such significant experiences (Bögeholz, 2006:80). The development of the affective foundation of assessment and judgement competences may thus be hampered (Bögeholz, 2006:80). Therefore, if more secondary school learners could be exposed to opportunities to experience nature (including birdwatching), an increase in positive birdwatching behaviour might be expected.

The EFA results (section 5.4.4) identified two factors, labelled ‘pro-environmental and avi-behaviour’ and ‘birdwatching behaviour’. The results indicated that learners seldom engage in both pro-environmental and avi-behaviour (2.18) and birdwatching behaviour (2.46) factors. These results indicate that learners are rather passive with regard to pro-environmental behaviour, and that their participation in birding activities was rather low.

Furthermore, when the results on behavioural intention and actual behaviour of secondary school learners towards birds and the natural environment and were compared, a gap was observed. Whereas more learners displayed intentions to participate in pro-environmental behaviour and avitourism activities, fewer learners displayed actual participation in pro-environmental behaviour and birding activities. For example, more learners were willing to separate their family's rubbish for recycling if it could preserve bird habitats, while only a few claimed that they have asked someone to recycle to limit production of waste that affect bird-life. These results are consistent with the findings of Maloney and Ward (1973:585) that indicated relatively high levels of verbal commitment, but lower levels of actual commitment. It was therefore established that most learners are willing to do a great deal to help curb environmental problems, but actually do little for the natural environment. Encouragingly, the research of Stevenson *et al*. (2013:5) indicated improvement in behaviour scores of learners who spent time outdoors, and suggested that time spent outdoors was the most important positive predictor of change in the behaviour component (actual commitment).

Based on the results and conclusions on actual pro-environmental behaviour of secondary school learners towards birds and the natural environment, the following is recommended:

- Secondary school libraries and public libraries should be encouraged to obtain literature (for example books, magazines) on birds and natural environment.
- Secondary school learners should be exposed to opportunities to experience nature and to spend time outdoors.
- Environmental education and avitourism role players should focus on the affective components (i.e. to raise the avi-affinity and avi-values of learners)

when developing environmental programmes or interventions, which could ultimately contribute to sustainable birdwatching behaviour.

Conclusions regarding behavioural involvement of secondary school learners in birdwatching and avitourism are discussed in the next section.

7.4.7 Behavioural involvement of secondary school learners in birding and avitourism

Behavioural involvement of participating secondary school learners in birding and avitourism was measured by demonstrating access to birding materials, applications (books, bird lists, and cell phone applications), and equipment (binoculars), as well as participation in birding courses, clubs, trips, and activities (section 5.3.2).

In the current study, an average involvement score of 31.63% was calculated for the overall behavioural involvement of participating learners in birding and avitourism, thus indicating a fairly passive involvement.

To improve on the behavioural involvement of secondary school learners in birdwatching and avitourism, the following is recommended, namely that secondary school learners should be encouraged to –

- become members of a bird club;
- attend bird courses;
- visit a bird park (e.g. Austin Roberts Bird Park in Pretoria) or the National Botanical Gardens;
- upload applications about birds on cellular phones;
- attend birding events (e.g. Sasol Bird Fair);
- participate in a birding tour;

In the preceding discussion (section 7.4), the main results and conclusions drawn from the descriptive statistics and factor analysis were summarised. In addition, where applicable, literature was used to confirm the results, and recommendations were provided. Additionally, in *phase 3*, the conceptual literacy framework for sustainable avitourism (*phase 2*) was empirically tested by applying structural equation modelling (SEM) (section 4.8.4c). The following section provides a summary of the results and main conclusions obtained from SEM.

7.5 PHASE 3: SUMMARY OF RESULTS AND CONCLUSIONS: EMPIRICAL ANALYSIS OF ENVIRONMENTAL AND AVITOURISM LITERACY – STRUCTURAL EQUATION MODELLING (SEM)

This section links to the achievement of the fifth secondary objective: to empirically test the conceptual literacy framework for sustainable avitourism by applying structural equation modelling. Using SEM, a stepwise process was followed to determine the dynamics of the directional sequential, the relationships within and between the different constructs used as building blocks of the final SEM model (see Figure 6.2). The main results and conclusion of the stepwise process are summarised in section 7.5.1, while the final SEM model is synthesised in section 7.5.2.

7.5.1 Summary of results and conclusions: Stepwise process

The main findings and conclusions regarding the three building blocks are:

- Building block 1 (section 6.2): The SEM model represented the relationships between 'avi-affinity and avi-awareness' and 'knowledge'. Both hypotheses (H_1 and H_2) indicated that avi-affinity and knowledge (β = .08) and avi-awareness and knowledge (β = .17) had a positive, but very weak relationship with knowledge. The results are similar to Larson, Green and Castleberry's (2011:81) study on general environmental orientations, indicating a very weak relationship between eco-affinity and knowledge, but a positive moderate relationship between eco-awareness and knowledge. It therefore appears that avi-affinity captures a unique aspect of avi-orientations not strongly affecting by bird and environmental knowledge.

- Building block 2 (section 6.3): The SEM model represented the relationships between 'avi-affinity and avi-awareness' and 'knowledge and avi-values'. The potential role of knowledge as a moderator[60] in the relationship between

[60] Moderator effect: "The effect of a third variable or construct changing the relationship between two related variables constructs" (Hair *et al.*, 2010:690). In this case, the relationship between two constructs

‘avi-orientations’ and ‘environmental and avi-values’ was explored based on the work of Meinhold and Malkus (2005:523) and Alp *et al*. (2006:210). Their findings indicated that adolescents who demonstrate more pro-environmental attitudes and greater environmental knowledge will report greater amounts of pro-environmental behaviours (Alp *et al.*, 2006:210; Meinhold & Malkus, 2005:523). Moreover, Meinhold and Malkus (2005:524) illustrate that the relationship between environmental attitudes and behaviour is noticeably stronger in high knowledge groups than in the low knowledge groups (Meinhold & Malkus, 2005:524). Three postulated models were tested in building block 2.

- Firstly, the strength of the relationships between ‘avi-orientation’ and ‘bird and environmental knowledge’ and ‘environmental’ and ‘avi-values’ was determined (section 6.3.1). The results of building block 2, SEM model 1 indicated that the relationship between avi-orientations (avi-affinity and avi-awareness) and the knowledge construct (β = .08; β = .17) was weak, while the relationship between knowledge and the avi-values (enjoyment (β = .15), pro-environmental values (β = .27) and utilisation (β = -.36)) constructs was moderate to weak.
- Secondly, the bird and environmental knowledge variable was removed from the model to determine the direct relationship between ‘avi-orientations’ and ‘environmental and avi-values’ (section 6.3.2). The results of building block 2, model 2, indicated that a relationship exists between avi-affinity and avi-values (critical resources (β = .56), enjoyment (β = .91), pro-environmental values (β = .54) and utilisation (β = .16)), as well as between and avi-awareness and avi-values (critical resources (β = .06), enjoyment (β = -.11), pro-environmental values (β = .30), and utilisation (β = -.21)).
- Lastly, since both model 1 and model 2 (building block 2) did not fit the data adequately, the potential role of knowledge as a moderator in the relationship between ‘avi-orientation’ and ‘environmental and avi-values’

(avi-orientations and avi-values) changes based on the level amount of a moderator (bird and environmental knowledge).

was explored in model 3 (building block 2). Based on adequate model fit (RMSEA = .048, CFI = .910, TLI = .097, IFI = .910), building block 2, model 3 (section 6.3.3) was interpreted. The results indicated that a moderating effect only exists between knowledge and avi-affinity with enjoyment and between knowledge and avi-awareness with enjoyment.[61] The results further imply that the relationship between the two constructs (avi-affinity and enjoyment) changes, based on the level/amount of the moderator (bird and environmental knowledge). Likewise, the relationship between avi-awareness and enjoyment changes based on the level of bird and environmental knowledge of secondary school learners. It can therefore be assumed that the relationships between avi-affinity and enjoyment, as well as the relationship between avi-awareness and enjoyment will be stronger in more knowledgeable learners than with learners with weaker knowledge of birds and the environment.

- Building block 3 (section 6.4) represented the full SEM model with respect to the relationships between avi-affinity, avi-awareness, bird and environmental knowledge, environmental and avi-values, behavioural intentions, and actual behaviour. Although model 2 (building block 3) provided an improvement over model 1 (building block 3) in terms of the standardised regression coefficients that were interpretable and the RMSEA value which indicated a good fit (0.053), the CFI, TLI and CFI values were slightly below 0.90 and therefore the model could not be regarded as acceptable. Thus, two options to improve model fit were explored. Firstly modification indices were considered (section 6.5), and secondly the role of involvement was explored in the proposed SEM model (section 6.7).

[61] Although there is a high level of awareness among secondary school learners that 'people should take better care of the environment the school learners did not express a high level of enjoyment birds and the natural environment. This has resulted in a weak negative relationship between enjoyment and avi-awareness. However, the relationship between relationship between avi-awareness and enjoyment will be stronger in more knowledgeable learners than with learners with weaker knowledge of birds and the environment.

- When modification indices were considered, the SEM model with additional covariances,[62] with a sound theoretical base for its existence, offered the best model fit (section 6.5). Details of the final SEM model are provided in section 7.5.2 that follows.
- Additionally, to further the study, five scenarios were explored to determine the role that involvement potentially played in the structural path of the final SEM model for sustainable avitourism (section 6.7). This links to the sixth secondary objective: to explore the role of behavioural involvement (in birding and avitourism) of secondary school learners in the model for sustainable avitourism. Five subsequent SEM models were tested to determine where involvement fit best in the final model. When all these fit indices were considered, the five SEM models presented an unsatisfactory fit with the observed data. However, when the five models were compared, involvement played the strongest role when placed at the end of the SEM model, after actual pro-environmental and avi-behaviour. Since the model did not show acceptable model fit, it was not included in the final SEM model.

The results and conclusions regarding the final SEM model are summarised next.

7.5.2 Summary of results and conclusions: Final SEM model

The final SEM model for sustainable avitourism for this study that derived from the stepwise process was presented in Figure 6.17. The final SEM model offered good model fit, as indicated by the RMSEA (0.043), CFI (0.900) and IFI (0.900). Figure 7.4 provides a simplified illustration, indicating the results of the final SEM model, while incorporating the hypothesised path diagram and the measurement and structural relationships.

[62] The additional covariance relationships are as a consequence of items that were adapted to the context of this study and also new items that were added in the questionnaire.

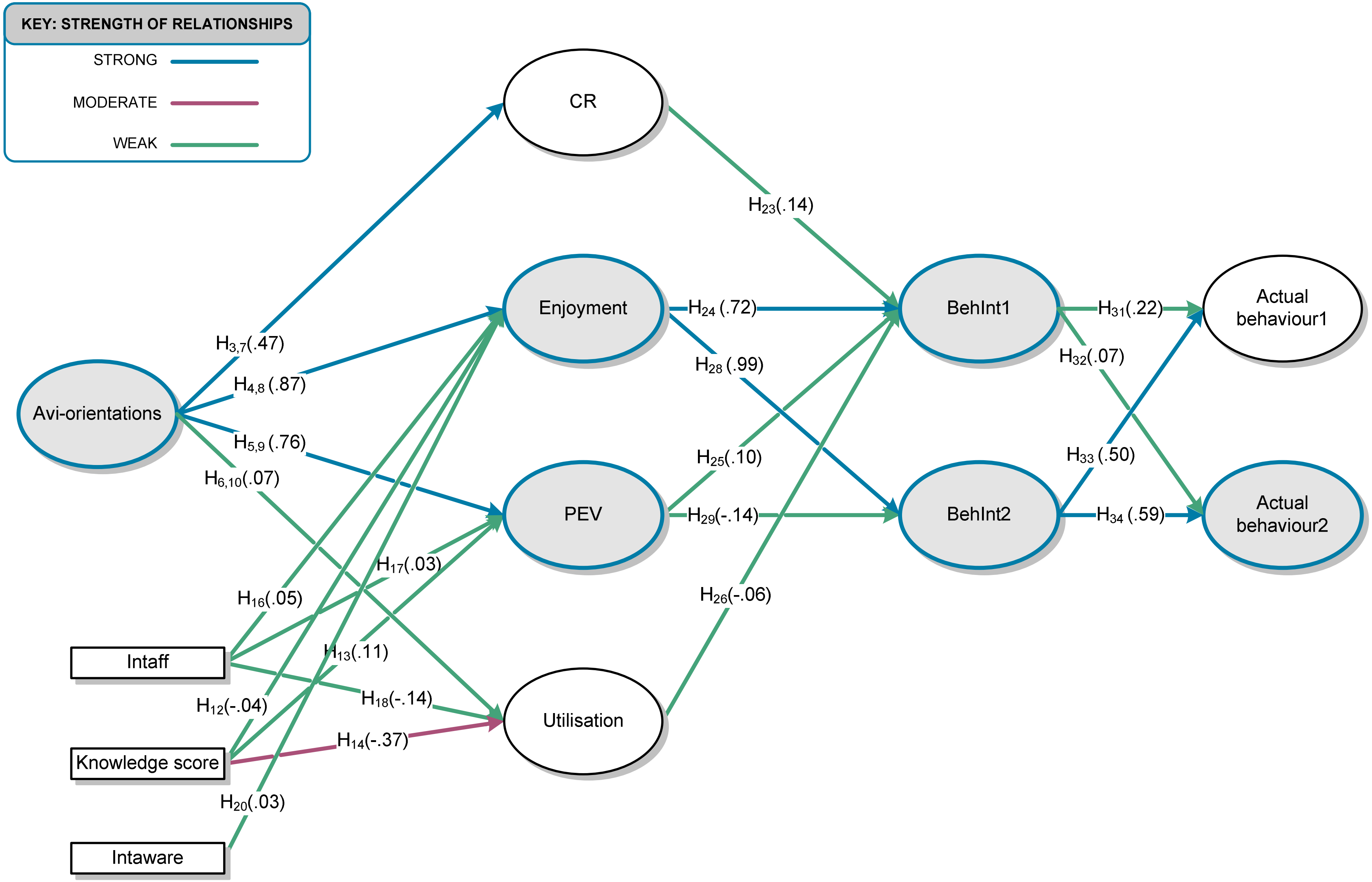

Figure 7.4: A simplified illustration of the final SEM model for sustainable avitourism

The results and conclusions regarding the final SEM model for this study, based on the strength of the relationships emphasised in Figure 7.4, are summarised below:

- Although avi-orientation had a positive relationship with all the components of environmental and avi-values, avi-orientation had the strongest positive relationship with enjoyment (.87) and pro-environmental values (.76).
- Knowledge indicated a positive, very weak relationship with pro-environmental values (.11) and a negative, very weak effect on enjoyment (-.04). However, knowledge had a negative, weak effect on utilisation (-.37). It can therefore be deduced that utilisation of the natural environment will potentially decrease in more knowledgeable learners than with learners with weaker knowledge of birds and the environment. In addition, there appears not to be a linear relationship between knowledge of secondary school learners and their current pro-environmental values and enjoyment of birds and the natural environment.
- The interaction between knowledge and avi-affinity influenced enjoyment (.05), pro-environmental values (.03), and utilisation (-.14).
- The interaction between knowledge and avi-awareness influenced enjoyment (.03).
- The role of knowledge, as explored during the stepwise process (building block 2), indicated that knowledge is a moderator of the relationship between avi-affinity and enjoyment, as well as avi-awareness and enjoyment. The results imply that the relationship between the two constructs (avi-affinity and enjoyment) is influenced by the level amount of the moderator (environmental and avi-knowledge). Likewise, the relationship between avi-awareness and enjoyment is influenced by the level of environmental and avi-knowledge of secondary school learners. It is acknowledged that the strength of the relationship is very weak and due to the sample size relationships resulted in significance. Further research is needed to confirm the role of knowledge as moderator. It can therefore be assumed that the relationships between avi-affinity and enjoyment, as well as the relationship between avi-awareness and enjoyment will be stronger in more

knowledgeable learners than with learners with weaker knowledge of birds and the environment.

- Enjoyment has a positive, strong relationship with intended pro-environmental and avi-behaviour (BehInt2) (.72) and has a positive, very strong relationship with intended birdwatching behaviour (BehInt2) (.99). Thus, enjoyment is the most important driver towards both intended pro-environmental and avi-behaviour, as well as intended birdwatching behaviour.
- Interestingly, critical resources and pro-environmental values played a less significant role towards intended pro-environmental and avi-behaviour (BehInt1) and intended birdwatching behaviour (BehInt2).
- Utilisation was considered a less important determinant of intended pro-environmental and avi-behaviour (BehInt1), showing a negative and weak effect (-.06).
- Intended pro-environmental and avi-behaviour showed a weak to moderate relationship with actual pro-environmental and avi-behaviour (.22), yet a fairly weak relationship with actual birdwatching behaviour (.07).
- A strong relationship was shown between intended birdwatching behaviour and both actual pro-environmental and avi-behaviour (.50) and actual birdwatching behaviour (.59).

To synthesise, the final SEM model for this study outlined a systematic set of relationships, providing an explanation of how the constructs and/or variables of environmental and avitourism literacy could facilitate behavioural change within secondary school learners' behaviour towards birds, bird habitat and avitourism.

A management model is a useful tool for problem solving, analysis, supporting and facilitating decision-making, and/or improving efficiency and effectiveness of organisations and teams. It provides a new way of viewing a situation, which could result in positive change to take place (Van den Berg & Pietersma, 2015:xii).

The practical application and usefulness of the proposed literacy model for sustainable avitourism for environmental education and avitourism role players is presented next.

7.6 RECOMMENDATIONS: THE PROPOSED LITERACY MODEL FOR SUSTAINABLE AVITOURISM

The primary objective of the study was to develop a literacy model for sustainable avitourism. The proposed literacy model for sustainable avitourism, as discussed below, was derived from the three methodological phases applied in this study (see Figure 1.2). The literacy model for sustainable avitourism is based on the results and conclusions of the study, and forms an integral part of the recommendations emanating from the study. The flow diagram of the literacy model (Figure 7.5) illustrates how the findings could be utilised and displays important determinants for facilitating behavioural change within secondary school learners' (Grade 8–10) behaviour towards birds, the natural environment, and avitourism, to achieve the primary objective of the study.

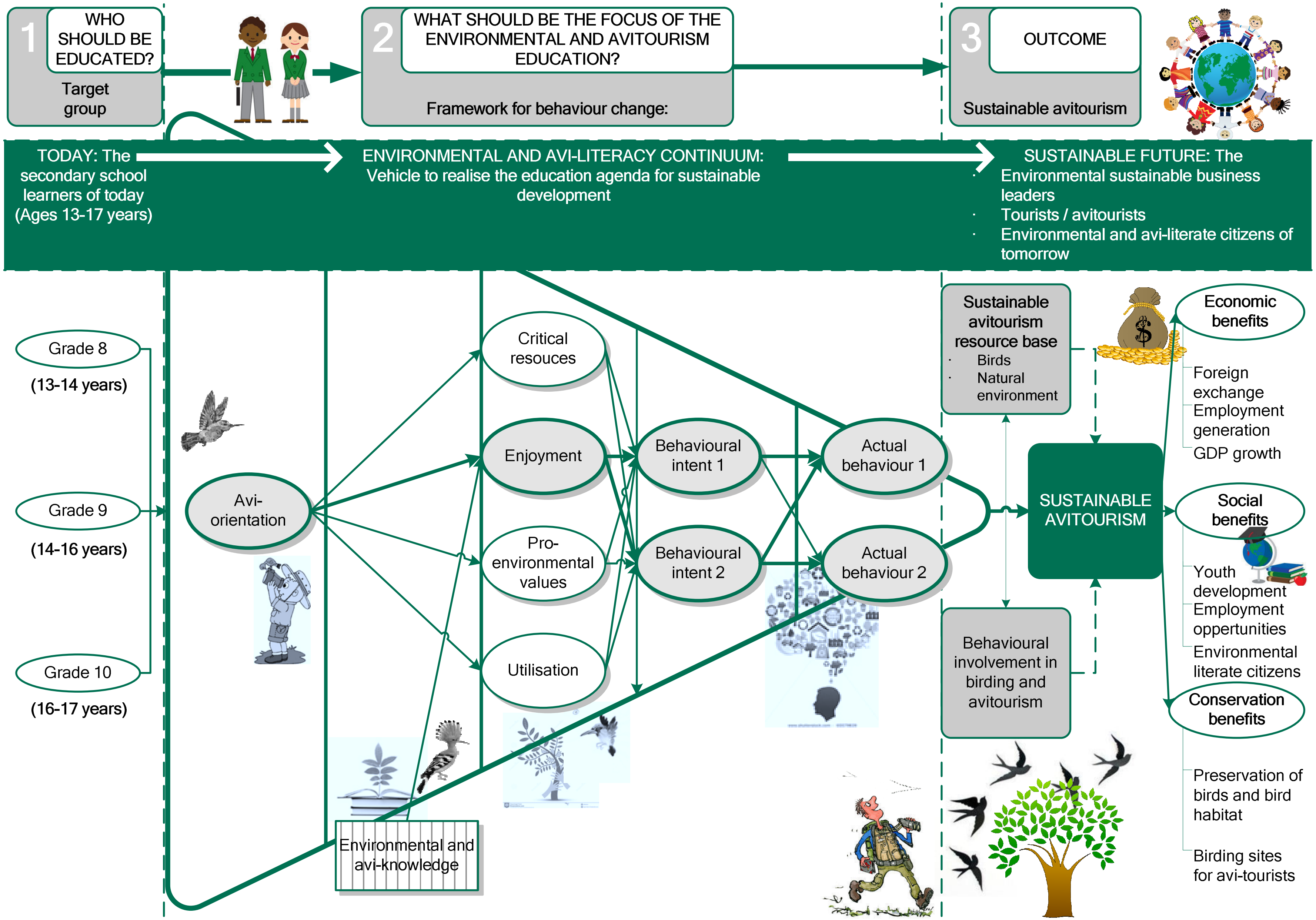

Figure 7.5: Proposed literacy model for sustainable avitourism

In essence, the proposed literacy model for sustainable avitourism offers applicable education, more specifically critical focus areas of environmental and avitourism literacy, as a mechanism to facilitate behavioural change within secondary school learners' behaviour towards birds, bird habitat and avitourism. Because of the complex nature of the proposed literacy model, an example of a simplified, practical model is also included in Appendices F.

The literacy model presented is applicable to and could be useful for various environmental education and avitourism role-players, for example, the public and private sectors, government departments (e.g. Gauteng Department of Education, Department of Tourism), secondary schools, and NGOs (e.g. BLSA, WESA). These role-players can use the literacy model as a guideline on the information that should be included or should be the main focus of environmental education programmes or intervention programmes that specifically focus on birds and the natural environment. In addition, the proposed literacy model for sustainable avitourism is a useful tool to assess the current environmental and avitourism literacy of different target groups (e.g. school learners of different ages, university students, or adults) and/or to measure the effectiveness of existing environmental education initiatives. Moreover, the literacy model may assist in producing meaningful programme evaluations that can help guide curriculum development efforts and identify those programmes and activities that are most effective at promoting pro-environmental and avi-behaviour.

An explanation of the flow diagram of the proposed literacy model is provided in the following section to describe how to apply the model. The diagram, illustrated in Figure 7.5, consists of three parts: who should be educated, what should be the focus of the education, and the envisaged outcome of the process.

7.6.1 Target group: Who should be educated?

The literacy model firstly indicates the target group of the education (see the first part of Figure 7.5). The question "Who should be educated?" in terms of birds and the sustainability of their natural habitat is posed. For the current study, that target group comprised secondary school learners in Grades 8, 9 and 10. The ages of the majority of participating learners ranged from14 to 16 years old. This target group was chosen since the current day secondary school learner will have a major influence on the future state of the natural environment (including birds and bird habitat), which makes innovative ways of interactive learning and engagement at school level on environmental sustainability highly relevant. The sustainability of natural resources must therefore be promoted amongst the target group to ensure that birds and their natural habitat, on which avitourism depends, are kept intact.

7.6.2 Framework for behaviour change: What should be the focus of the environmental and avitourism education?

Following the specification of the target group, the second question is posed, "What should be the focus of education to facilitate behaviour change amongst the specified target group?" (see middle section of Figure 7.5). Changing environmental behaviour of secondary school learners and encouraging environmental citizenship require a firm understanding of what works in terms of educational programmes or interventions aimed at behavioural change. The current study provided insight from both a theoretical as well as an empirical perspective, as explained next.

From a theoretical perspective, based on the literature review (*phase 1*, refer to Chapter 2), a conceptual literacy framework for facilitating behaviour change amongst secondary school learners to enhance sustainable avitourism (*phase 2*, refer to Chapter 3) was developed for the current study. Since this study was designed on the basis that pro-environmental and avi-behaviour of secondary school learners will set a sound basis for sustainable avitourism in future, the components included in the conceptual literacy framework (see Figure 3.3) were identified as possible determinants of pro-environmental and avi-behaviour. As illustrated in Figure 7.5, the conceptual literacy framework for sustainable avitourism consisted of five components, namely 'avi-orientation', 'bird and environmental knowledge', 'environmental and avi-values' and 'behavioural intention' leading to 'actual pro-environmental and avi-behaviour'. Collectively these components are considered as 'environmental and avitourism literacy'' that could facilitate behaviour change of secondary school learners, to ultimately enhance sustainable avitourism.

The conceptual literacy framework for sustainable avitourism (*phase 2*, refer to Chapter 3) was then tested to gain insight from an empirical perspective (*phase 3*, Chapter 6). A stepwise process was followed to understand the relationships within and across each of the building blocks of the final structural equation model (SEM) (section 6.1). The final SEM model for sustainable avitourism (section 6.6), that derived from the stepwise process, offered adequate model fit, indicating that the model is valid and interpretable (In section 7.5.2 the final SEM model was synthesised).

Additionally, critical focus areas of the environmental and avitourism literacy continuum were identified and are emphasised in the literacy model for sustainable avitourism (see highlighted constructs in the second part of Figure 7.5). Furthermore, the critical paths identified will enhance the highest likelihood of changing actual behaviour towards birds and the natural environment (see the highlighted arrows between the constructs in the second part of Figure 7.5). The critical paths were based on the strength of the relationships in the final SEM model. The strength of the relationships displayed the components in the literacy model that played a more significant role to facilitate behaviour change among secondary school learners towards birds and the natural environment. As illustrated in Figure 6.5, the following critical focus areas are recommended to consider when planning environmental education programmes and intervention programmes for the sustainability of birds and the natural environment:

- Avi-orientation (ways in which secondary school learners perceive the natural world, in this case, birds and bird habitat specifically) had the strongest positive relationship with enjoyment of birds and the natural environment. Avi-orientation thus had the strongest effect on enjoyment.
- Sequentially, enjoyment had very strong relationships with both intended pro-environmental and avi-behaviour (BehInt1) and intended birdwatching behaviour (BehInt2). These results indicated that the enjoyment of birds and the natural environment indicated the highest likelihood to influence the behavioural intentions of secondary school learners towards birds, and the natural environment and avitourism.
- In turn, intended pro-environmental and avi-behaviour had a positive relationship with actual pro-environmental and avi-behaviour, while a very

strong relationship existed between intended birdwatching behaviour and both actual pro-environmental and avi-behaviour and actual birdwatching behaviour.

The final part of the proposed literacy model for sustainable avitourism, the envisaged outcome, is discussed next.

7.6.3 Outcome: Sustainable avitourism

In the previous sections, the proposed model was discussed to indicate who should be educated and what should be the focus of the education. It was shown that the current day secondary school learners (section 7.6.1) should be exposed to environmental and avitourism education according to the critical focus areas as identified in this study (section 7.6.2). The final part of the literacy model for sustainable avitourism indicates the envisaged outcome of the literacy model (see the third part of Figure 7.5): a sustainable avitourism resource base (birds and bird habitat), the behavioural involvement in the avitourism activity, and enhanced sustainable avitourism.

Firstly, it is envisaged that the framework, aimed at facilitating behavioural change, will lead to a sustainable avitourism resource base, namely birds and the natural environment in which birds live. Sustainable avitourism is dependent upon this natural resource base, which is being placed under increasing pressure.

Secondly, the envisaged outcome of the proposed literacy model is behavioural involvement of secondary school learners in birdwatching and avitourism. The descriptive analysis of the current study indicated fairly passive involvement of secondary school learners in birdwatching and avitourism. Furthermore, the SEM results (section 6.7) on the role that involvement played in the structural path of the final model for sustainable avitourism, indicated that involvement played the strongest role when placed at the end of the SEM model, after actual pro-environmental and avi-behaviour. Involvement in birdwatching and avitourism is thus, for the current study, an outcome of the entire process. The results indicated that the involvement of secondary school learners in birdwatching and avitourism would most probably occur if learners have acquired positive avi-orientations, knowledge of birds and their environment, positive value systems regarding birds and the natural environment, the intent to act pro-environmentally for the sustainability of birds and the natural environment, and if they show pro-environmental and avi-behaviour.

Thirdly, the final outcome of the proposed model is ultimately enhanced sustainable avitourism, which in turn has the potential to contribute to economic, social, and conservation benefits for South Africa. Economic benefits include foreign exchange earnings from money spent on birding trips, government income taxes, and employment generation, while social benefits include education and upliftment of the youth, stimulation of regional and rural development, alternative sources of income and employment of local communities, and local communities gaining a greater awareness of conservation of the natural and cultural resources, thus integrating conservation and rural development. Conservation benefits include local awareness of the values of biodiversity and the conservation of natural resources and bird species, and providing high-quality visitor experience, as well as ensuring good visitor behaviour. The development of sustainable avitourism via sustainable avitourism intervention programmes, aimed at secondary school learners, to facilitate behavioural change, is therefore anticipated to improve the economic, social and environmental sustainability of South Africa. Ultimately, the learner of today should become the responsible tourist of tommorow.

The limitations of the study are discussed in the next section.

7.7 LIMITATIONS OF THE STUDY

The findings in this study are subject to at least four limitations.

- First, the Gauteng Department of Education granted permission to distribute questionnaires to four school districts in Gauteng only. A non-probability sampling approach (purposive sampling) was therefore chosen based on this data collection procedure.
- Second, since the data was only collected in Gauteng and in a secondary school learner (single type) setting, these results may not be generalisable to all secondary school learners.

- Third, only secondary learners in Grade 8–10 (ages 13–17 years) were included in this study, because of the Grade 11–12 learners' busy school calender.
- Fouth, the data for the current study were collected from July to October in 2014 and are reported in 2017. The data were analysed in 2015 and interpreted and written up from 2016 to 2017.

7.8 RECOMMENDATIONS FOR FUTURE RESEARCH

The following recommendations are made with respect to future research:

- This study investigated avi-orientation, bird and environmental knowledge, environmental and avi-values, and behavioural intention as vital components that contribute to explaining the actual pro-environmental and avi-behaviour of secondary school learners, and ultimately influencing sustainable avitourism. Other determinates/variables that might influence secondary school learners' pro-environmental and avi behaviour, such as self-efficacy, could be further investigated (Meinhold & Malkus, 2005:518).
- The target population for the current research focused on secondary school learners in Grade 8, 9 and 10 (14–16 years). Opportunities thus exist for extending the research to understand other target groups or learner age-groups, for example, junior and senior phase primary school learners, senior phase secondary school learners (Grade 11 and 12), or college and university students.
- The measuring instrument could be further refined to measure involvement in bird watching and avitourism. An item could be inlucded on whether family members or friends have ever exposed the learners to birding.
- Alternatively, even if they know anyone who is involved in birding activities.
- In the current research, a model was proposed to change secondary school learners' behaviour towards birds and the natural environment, and ultimately enhance sustainable avitourism in South Africa. This research identified critical focus areas leading to pro-environmental and avitourism behaviour, which could be applied in an intervention programme. The

findings of the current study could therefore assist in developing an avitourism intervention programme aimed at secondary school learners.

- The current study was based on cross-sectional data, and therefore changes in the behaviour of secondary school learners across time was not monitored. The questionnaire can be used in future research an in experimental research design before and after an intervention programme to determine the success of the programme. This can be done by performing a pre-test post-test design or a Solomon-four group design as a monitoring mechanism regarding changes in the constructs measured in the questionnaire, such as avi-orientations, bird and environmental knowledge, environmental and avi-values, behavioural intentions, and pro-environmental and avi-behaviour.
- The current research was conducted in Gauteng, and can also be extended to the other provinces of South Africa. For example, the environmental and avitourism literacy of secondary school learners living near the coast might be different from learners living in-land. Additional studies are needed to provide greater understanding of environmental and avi-behaviour of school learners.
- The education framework of behaviour change can also be applied to a larger significance, for example, to educate a specific target group on health related topics such as obesity, drug abuse, and sex.
- The proposed literacy model of the present study could also be applied to other educational contexts, for example, the appreciation of art and music. For example, the children in France are given free access to the Louvre Art Gallery in Paris, benefiting a life-long apprectation of art.

7.9 CONCLUSION

To realise the potential of sustainable avitourism in South Africa, now and in the future, the protection and conservation of birds and their natural habitat are imperative. However, our planet is experiencing, at an alarmingly accelerating rate, the detrimental effects of climate change, environmental degradation, and biodiversity loss. Consequently, the numbers of bird species, playing an integral role in biodiversity, are also decreasing at a rapid rate in all parts of the world. The literature review highlighted that *education* is our best hope for solving our current environmental and sustainability problems. The current day learners will have a major influence on the future state of the natural environment (including birds and bird habitat) and, therefore, the sustainability of avitourism in South Africa. This study thus emphasised the importance of relevant education that will encourage *changes* in *values*, *mind-sets*, and *behaviour* concerning the sustainability of birds and the natural environment in which birds live.

The aim of this research was to develop a literacy model for sustainable avitourism. To reach this aim, the methodological procedure operationalised in three phases and addressed each of the secondary objectives of the study. In *phase 1*, the literature review conceptualised the components used in this study and contributed to the development of the conceptual framework for sustainable avitourism, on which this study was based (*phase 2*). In *phase 3*, the study took an empirical nature, based on environmental and avitourism literacy of secondary school learners within Gauteng.

Based on results obtained from questionnaires completed by learners (n = 5 488) in Grade 8–10 (ages 13–17 years), at 17 secondary schools in four Gauteng school districts, this study provides insight into the environmental and avitourism literacy components of secondary school learners. These insights include secondary school learners' avi-orientation, behavioural involvement, bird and environmental knowledge, environmental and avi-values, behavioural intention and actual behaviour towards birds, bird habitat, and avitourism. Furthermore, the empirical analysis tested the conceptual framework and the final SEM model for enhancing sustainable avitourism derived from this analysis. *Critical paths* were identified in the final SEM model that will enhance the likelihood of *pro-environmental and avi-behaviour change* to take place.

The proposed literacy model for sustainable avitourism forms an integral part of the recommendations emanating from the study. The proposed model displayed important determinants for facilitating behavioural change within secondary school learners' behaviour towards birds, bird habitat and avitourism. The literacy model could be useful for environmental education and avitourism role-players, and may assist in producing meaningful programme evaluations that can help guide curriculum development efforts and identify programmes and activities that are most effective at promoting pro-environmental and avi-behaviour. In addition, the proposed literacy model could be applied to other educational contexts, for example, the appreciation of music, art and culture.

The contribution of this study was threefold. The study made a theoretical, empirical, and practical contribution by means of recommendations to conservation, environmental education, and tourism (specifically avitourism) role-players:

- *Theoretical contribution*: A conceptual framework for sustainable avitourism was developed, based on the environmental and avitourism literacy components. The components were taken from the environmental education and environmental literacy domain and applied to the context of this study. The conceptual framework for sustainable avitourism that was developed contributes to the body of knowledge in the tourism management field.
- *Empirical contribution*: The environmental and avitourism literacy components presented in the conceptual literacy framework of sustainable tourism were tested empirically, and were confirmed based on the SEM results. Additionally, critical paths were identified in the final SEM model that will enhance the likelihood of pro-environmental and avi-behaviour change.
- *Practical contribution*: Based on the insight from this study, gained from a theoretical as well as an empirical perspective, a final literacy model for sustainable avitourism was proposed, explaining the practical application and usefulness to conservation, environmental education, and avitourism stakeholders. Detail on the purpose and essence of the model, followed by an explanation on when and how to use the model was provided.

In addition, the study contributed to the following niche research focus areas: research on the youth of South Africa, environmental education and environmental literacy, environmental sustainability, and niche tourism, more specifically avitourism. The research findings and recommendations may complement and enhance sustainable avitourism in South Africa.

In conclusion, based on the results of this study, an environmental education programme or intervention programme to promote positive avi-orientation, environmental and avi-knowledge, environmental and avi-values, and pro-environmental behaviour among secondary school learners is suggested. This study specifically highlighted the importance of enjoyment of birds and the natural environment as a critical focus area that will enhance the likelihood of pro-environmental and avi-behaviour change to take place. To increase environmental value sets, specifically the enjoyment of birds and nature, it is recommended to encourage learners to spend time outdoors, since outdoor activities have been linked to affective components and were found to be a key predictor of pro-environmental and avi-behaviour.

Consequently, when designing environmental or intervention programmes, conservation and environmental educators and avitourism role-players should create opportunities for secondary school learners to encounter and experience birdlife, spend time outdoors, and to visit informal educational settings. Such programmes could empower learners within an educational environment to improve environmental and avitourism literacy and likewise improve their responsible behaviour in support of future sustainability of birds and their natural habitat. These actions will ultimately create a love for birds and nature as a whole and motivate secondary school learners to love, conserve, and sustain birdlife over a lifetime. As outlined in the 2030 Agenda for Sustainable Development (see UNWTO, 2017a), young women and men are critical agents of change and the sustainable development goals will provide a platform to channel their infinite capacities for activism into the creation of a better world. The future of humanity and of our planet lies in our hands. It lies also in the hands of today's younger generation, who will pass the torch to future generations. Ultimately, the learners of today are the responsible tourists, environmental responsible business leaders, and environmental and avitourism literate citizens of tomorrow.

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APPENDICES

APPENDIX A: Final questionnaire

UNISA bureau of market research

AVI-LITERACY SURVEY

BIRDS (AVI)-TOURISM AND THE ENVIRONMENT

Conducted by
THE DEPARTMENT OF TRANSPORT ECONOMICS, LOGISTICS AND TOURISM
UNIVERSITY OF SOUTH AFRICA (Unisa)

in collaboration with
THE BUREAU OF MARKET RESEARCH (BMR)
(YOUTH RESEARCH UNIT)

Dear Learner

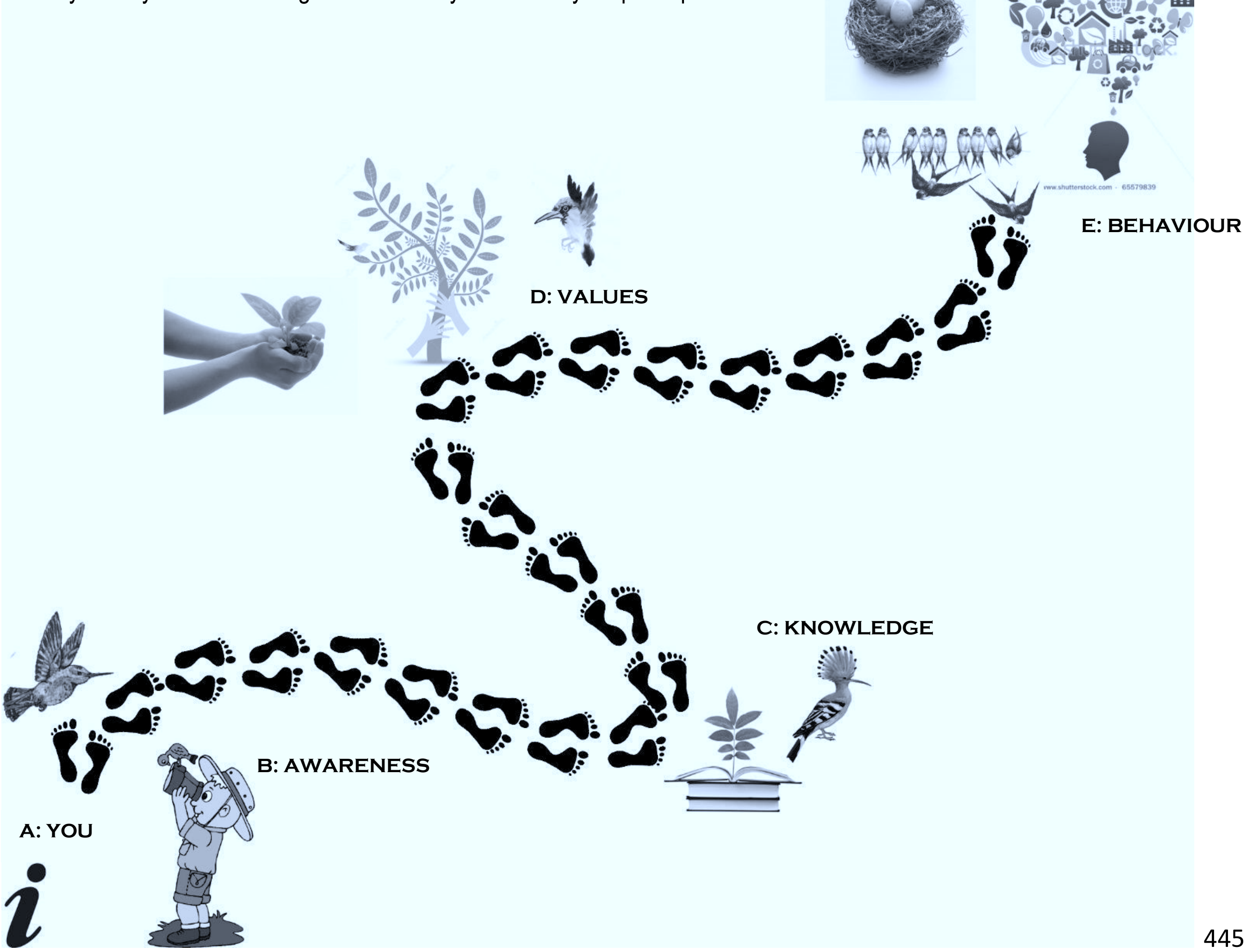
The Department of Transport Economics, Logistics and Tourism at Unisa in conjunction with the Youth Research Unit (YRU) of the Bureau of Market Research (BMR) is doing research on *young people's thoughts of and behaviour towards birds, birding tourism (avi-tourism) and the environment*. Why is this important? Well, in order to ensure that South Africa has a flourishing tourism industry, it is important for us to understand how you think and feel about bird-life (as a crucial part of our economy). Today, we are interested in how ***you*** think and feel about birds and the natural environment. Your response and input are valuable to us because they help us to understand how *millennials* (that's you!!) feel about birding as a component of tourism. Young people can make a difference for a sustainable future!

The survey is conducted with the permission of the Gauteng Province Department of Education and the school principal.

All information in this questionnaire is confidential. Thus you do not have to write your name on the questionnaire.

Please follow the instructions provided below and complete the questionnaire as honestly as possible.

Thank you very much for aiding us in the study. We value your participation!



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1-5

Instruction:

Please read the questions carefully and write your answer in the space provided or circle the correct answer as illustrated in the following example:

1. Do you like birds?

Yes	1	N	2

A: INFORMATION ABOUT YOU

1. Please indicate your gender.

Male	1	Female	2

6

2. Please indicate your age in numbers (e.g. 14).

_______ years 7-8

3. In which school grade are you?

Grade 8	1
Grade 9	2
Grade 10	3

9

4. What is your home language? The language that you speak the **most** at home.

Afrikaans	
English	
IsiNdebele	
IsiXhosa	
IsiZulu	
Sepedi	
Sesotho	
Setswana	
SiSwati	
Tshivenda	
Xitsonga	
Other (Specify)	

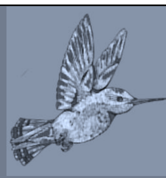
10-11

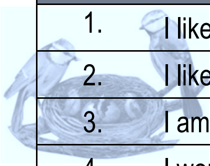
5. What is your race group?

African	
Indian	
Coloured	
White	
Asian	
Other (Specify)	

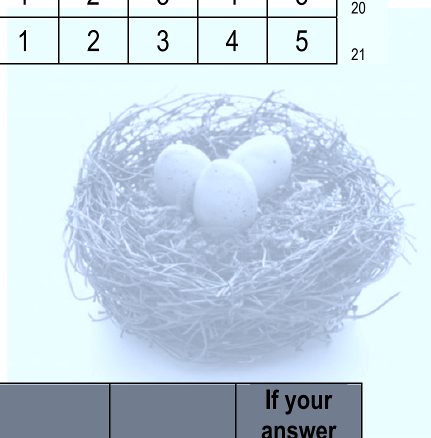
12

6. Where do you live? (Name of suburb or township) ____

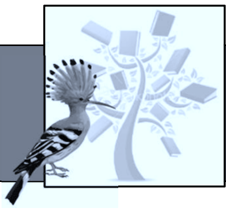




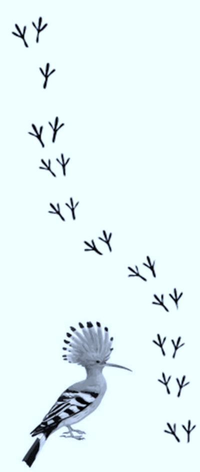
B1:	INTEREST IN BIRDS AND THEIR HABITAT Please indicate your level of agreement with each of the following statements (Mark only ONE response to each statement)	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	
1.	I like to learn about different bird species	1	2	3	4	5	13
2.	I like to read about birds	1	2	3	4	5	14
3.	I am interested in learning new ways to help protect birds	1	2	3	4	5	15
4.	I would give some of my own money to help save birds	1	2	3	4	5	16
5.	People need to take better care of birds	1	2	3	4	5	17
6.	People need to take better care of bird habitats (the areas where they live)	1	2	3	4	5	18
7.	I like to spend time in places where birds live	1	2	3	4	5	19
8.	I like to learn about natural bird habitats	1	2	3	4	5	20
9.	I would voluntarily clean parks in my neighbourhood to help birds	1	2	3	4	5	21



B2:	INVOLVEMENT IN BIRD-WATCHING AND AVI-TOURISM Please answer each question below:	YES	NO	If your answer was Yes, HOW MANY please write the number (e.g. 4)	
1.	Do you own a bird book?	1	2		22
2.	Do you own a pair of binoculars?	1	2		23
3.	Have you ever attended a bird course/s?	1	2		24
4.	Are you a member of a bird club/s?	1	2		25
5.	Have you downloaded an application/s on your cellphone about birds?	1	2		26
6.	Have you ever participated in a trip/s to watch birds?	1	2		27
7.	Have you ever listened to bird sounds via an application on your cellphone?	1	2		28
8.	Do you feed birds?	1	2		29

C:	**BIRD AND ENVIRONMENTAL KNOWLEDGE** **Please circle the number of the correct answer in the column to the right.** 						
1.	**The National bird of South Africa is the …** 1)  2)  3)  4)  5) 	1	2	3	4	5	30
2.	**Which one of the following bird species is on the endangered list?** 1) Rosyfaced Lovebird 2) Laughing Dove 3) Rock Pigeon 4) Crowned Lapwing/Plover 5) Blue Crane	1	2	3	4	5	31
3.	**Which one of the following statements about birding tourism is not true?** 1) Irresponsible birders play audio recordings of bird calls to attract birds 2) It causes trampling of the environment 3) It draws millions of visitors to different sites across the country 4) It generates millions of dollars in foreign exchange earnings 5) It causes positive relations between South Africans and tourists	1	2	3	4	5	32
4.	**Which one of the following environmental impacts would have the worst effect on birds?** 1) Litter 2) Loss of habitat 3) Air pollution 4) Soil erosion 5) Noise pollution	1	2	3	4	5	33
5.	**A scarce bird (e.g. Cape Weaver) is most likely to become extinct (die out) in the area, because of:** 1) Competition with other weavers 2) Warming of the area where they live 3) Pollution limiting their reproduction 4) The destruction of their habitat (the reedbeds where they live) 5) The limiting of their food supply due to acid rain	1	2	3	4	5	34
6.	**Killing birds such as raptors/vultures that prey on other animals or eat meat from carcasses:** 1) Is necessary and should be done 2) May increase the number of other animals 3) Does not affect other animals in the area 4) May decrease the number of other animals 5) Will help protect the environment 	1	2	3	4	5	35

7.	**In which of the following habitats would you expect a high diversity of bird species?** 1) Pine plantation 2) The botanical garden in Pretoria 3) Old lands previously used for agriculture 4) The grassland between Pretoria and Johannesburg 5) Maize field	1	2	3	4	5	36
8.	**The conservation status of the Tawny Eagle (*a bird of prey that is found in Gauteng*) is 'vulnerable', indicating a decline in their numbers. Which action will not improve their numbers?** 1) Improving their habitat (the area where they live) 2) Protecting indigenous savanna trees, where they can breed and eat 3) Allowing bird hunting during the hunting season 4) Stopping bird poisoning in natural areas 5) Keeping rivers unpolluted  *The Tawny Eagle*	1	2	3	4	5	37
9.	**South Africa has more than …… bird species. (Indicate the closest number)** 1) 1 250 2) 950 3) 450 4) 371 5) 171	1	2	3	4	5	38
10.	**Which item is not typical of a bird-watcher's behaviour?** 1) The bird's welfare is the primary concern of the bird-watcher 2) Birds must not be chased 3) Bird habitat must not be damaged 4) Audio recordings of bird songs should be played loudly to attract certain bird species 5) Rare birds and birds that are breeding should be treated with extra care	1	2	3	4	5	39



D:	ENVIRONMENTAL AND AVI-VALUES Please state your level of agreement with each statement below (Mark only ONE response to each statement)	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	
1.	I save water because it is important for the survival of birds	1	2	3	4	5	40
2.	I save electricity because it could decrease air pollution, which endangers many bird species	1	2	3	4	5	41
3.	Various birds species will die out if we do not live in tune with nature	1	2	3	4	5	42
4.	I enjoy trips to the countryside in order to observe birds in their natural habitat	1	2	3	4	5	43
5.	Sitting at the edge of a pond watching birds in flight is enjoyable	1	2	3	4	5	44
6.	It is interesting to know what kinds of birds live close to ponds or rivers	1	2	3	4	5	45
7.	Industrial smoke from factories that kills birds makes me angry	1	2	3	4	5	46
8.	It upsets me to see that bird habitats are destroyed to put up new buildings	1	2	3	4	5	47
9.	We must set aside areas to protect endangered birds species	1	2	3	4	5	48
10.	Society must continue trying to solve even the biggest environmental problems that affect birds	1	2	3	4	5	49
11.	Humans have the right to change natural bird habitats as they see fit	1	2	3	4	5	50
12.	We need to clear bird habitats in order to grow crops	1	2	3	4	5	51
13.	We should remove garden weeds to help flowers grow	1	2	3	4	5	52
14.	Our planet has unlimited resources	1	2	3	4	5	53
15.	Nature is always able to restore itself	1	2	3	4	5	54
16.	We must build more roads so that people can easily travel to the natural attractions	1	2	3	4	5	55
17.	Our plants, birds and animals are of economic importance and need to be protected	1	2	3	4	5	56
18.	Worrying about birds often holds up development projects (e.g. building houses, shopping centres, etc.)	1	2	3	4	5	57
19.	People worry too much about pollution	1	2	3	4	5	58
20.	Human beings are more important than birds	1	2	3	4	5	59

E1:	BEHAVIOUR: INTENTION *How you <u>THINK</u> about the environment?* **Please state what is <u>true about you</u> with each statement below (Mark only ONE response to each statement)**	Not at all true of me	Slightly true of me	Somewhat true of me	Very true of me	Extremely true of me	
1.	I would be willing to stop buying some products to save the lives of birds	1	2	3	4	5	60
2.	I would be willing to save electricity if it could avoid killing birds	1	2	3	4	5	61
3.	I would be willing to save water because it is important for the survival of birds	1	2	3	4	5	62
4.	I would be willing to give my own money to protect bird habitats	1	2	3	4	5	63
5.	I would be willing to ride the bus / walk to more places if it could save more birds	1	2	3	4	5	64
6.	I would be willing to separate my family's rubbish for recycling if it could preserve bird habitats	1	2	3	4	5	65
7.	I would be willing to give my own money to help protect wild birds	1	2	3	4	5	66
8.	I would be willing to turn off the water while I wash my hands if it could preserve bird habitats	1	2	3	4	5	67
9.	I am willing to buy a bird book to assist me in identifying birds	1	2	3	4	5	68
10.	I am willing to buy a bird book to learn more about birds and bird habitats	1	2	3	4	5	69
11.	I am willing to talk to my teachers about a bird club at school	1	2	3	4	5	70
12.	I am willing to join a local bird-watching club	1	2	3	4	5	71
13.	I would be willing to put up a bird house or a bird feeder near my home	1	2	3	4	5	72
14.	I would be willing to go on a bird-watching tour in my area	1	2	3	4	5	73
15.	I would be willing to go on a bird-watching tour in a nature reserve	1	2	3	4	5	74
16.	I would like to visit the local zoo to learn more about birds	1	2	3	4	5	75

E2:	BEHAVIOUR AND THE ENVIRONMENT *What do you DO about the environment?* **Please state your action with each statement below (Mark only ONE response to each statement)**	Never	Seldom	Sometimes	Often	Always	
1.	I have talked to someone about pollution that causes destruction of bird habitats	1	2	3	4	5	76
2.	I have talked to someone about how to limit environmental problems that affect bird habitats	1	2	3	4	5	77
3.	I have asked someone not to buy products that can cause harm to birds	1	2	3	4	5	78
4.	I have asked someone to recycle some of the things we use to limit production of waste that is bad for bird-life	1	2	3	4	5	79
5.	I have asked others what I can do to help create a healthy environment that is good for bird-life	1	2	3	4	5	80
6.	I read stories that are mostly about birds	1	2	3	4	5	81
7.	I have talked to someone about a bird-watching club at school	1	2	3	4	5	82
8.	I have visited a bird park	1	2	3	4	5	83
9.	I have been on a bird-watching tour in a nature reserve	1	2	3	4	5	84
10.	I have visited the local zoo to learn more about birds	1	2	3	4	5	85
11.	I have visited the local museum to learn more about birds	1	2	3	4	5	86

Thank you very much for your time and for participating in this survey!

APPENDIX B: Pilot questionnaire

UNISA bureau of market research

AVI-LITERACY SURVEY

BIRDS (AVI)-TOURISM AND THE ENVIRONMENT

Conducted by
THE DEPARTMENT OF TRANSPORT ECONOMICS, LOGISTICS AND TOURISM
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in collaboration with
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(YOUTH RESEARCH UNIT)

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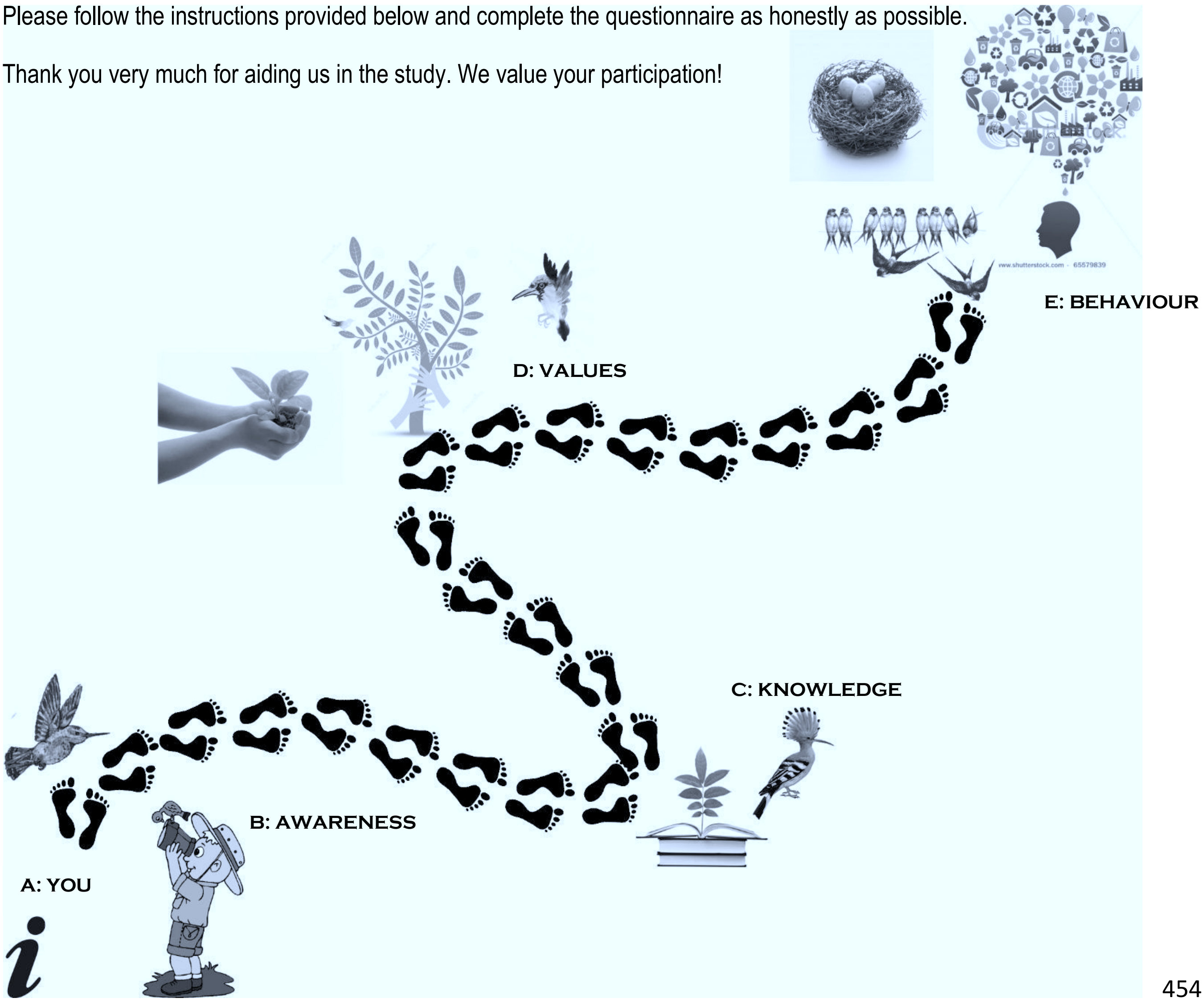

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1-4

Instruction:

Please read the questions carefully and write your answer in the space provided or circle the correct answer as illustrated in the following example:

1. Do you like birds?

Yes	1	N	2

A: INFORMATION ABOUT YOU

1. Please indicate your gender.

Male	1	Female	2

5

2. Please indicate your age in numbers (e.g. 14).

_______ years

6-7

3. In which school grade are you?

Grade 8	1
Grade 9	2
Grade 10	3

8

4. What is your home language?

Afrikaans	
English	
IsiNdebele	
IsiXhosa	
IsiZulu	
Sepedi	
Sesotho	
Setswana	
SiSwati	
Tshivenda	
Xitsonga	
Other (Specify)	

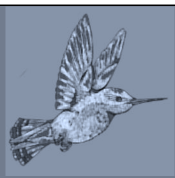
9

5. What is your race group?

African	
Indian	
Coloured	
White	
Asian	
Other (Specify)	

10

6. Where do you live? (Name of suburb or township) ____



B1:	INTEREST IN BIRDS AND THEIR HABITAT Please indicate your level of agreement with each of the following statements (Mark only ONE response to each statement)	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	
1.	I like to learn about different bird species	1	2	3	4	5	11
2.	Birds are important to people	1	2	3	4	5	12
3.	I like to read about birds	1	2	3	4	5	13
4.	Birds are easily harmed by people	1	2	3	4	5	14
5.	I am interested in learning new ways to help protect birds	1	2	3	4	5	15
6.	People need birds to live	1	2	3	4	5	16
7.	My life would change if there were no birds	1	2	3	4	5	17
8.	I would give some of my own money to help save birds	1	2	3	4	5	18
9.	People need to take better care of birds	1	2	3	4	5	19
10.	People need to take better care of bird habitats (the areas where they live)	1	2	3	4	5	20
11.	I like to spend time in places where birds live	1	2	3	4	5	21
12.	It makes me sad to see homes built where bird habitats used to be	1	2	3	4	5	22
13.	I like to learn about natural bird habitats	1	2	3	4	5	23
14.	I would voluntarily clean parks in my neighbourhood to help birds	1	2	3	4	5	24

B2:	INVOLVEMENT IN BIRD-WATCHING AND AVI-TOURISM Please answer each question below:	YES	NO	If your answer was Yes, HOW MANY please write the number (e.g. 4)	
1.	Do you own a bird book?	1	2		25
2.	Do you own a pair of binoculars?	1	2		26
3.	Have you ever attended a bird course/s?	1	2		27
4.	Are you a member of a bird club/s?	1	2		28
5.	Have you downloaded an application/s on your cellphone about birds?	1	2		29
6.	Have you ever participated in a trip/s with your family specifically to watch birds?	1	2		30
7.	Have you ever participated in a field/school trip/s to watch birds?	1	2		31
8.	Have you ever listened to bird sounds via an application on your cellphone?	1	2		32
9.	Do you feed birds?	1	2		33
10.	Have you ever used a bird list to identify birds that you have seen?	1	2		34
11.	Have you ever hunted birds?	1	2		35

C1: KNOWLEDGE OF BIRDS

These birds belong to a specific family. Which one?
Please write the correct letter (e.g. A, B, C, etc.) describing the bird family name in the 'answer' column next to the bird illustration.

No	BIRD ILLUSTRATION	ANSWER	
1.		A	36
2.		D	37
3.		F	38
4.		E	39
5.		H	40
6.		C	41
7.		B	42
8.		G	43

Letter	BIRD FAMILY NAME
A	Ducks
B	Hornbills
C	Kingfishers
D	Owls
E	Pigeons
F	Raptors (Birds of prey)
G	Sunbirds
H	Swallows

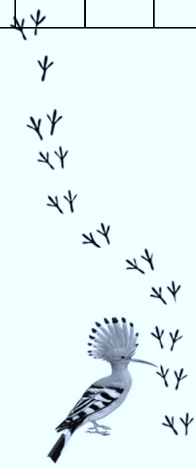
Can you identify these bird species? **These birds are commonly found in Gauteng.**
Circle the correct bird species for each bird.

1.		44
2.		45

BIRD SPECIES
1) African Hoopoe 2) African Kingfisher 3) Crested Barbet
1) Secretary Bird 2) Blue Crane 3) Hadeda Ibis

C2:	**BIRD AND ENVIRONMENTAL KNOWLEDGE** **Please circle the number of the correct answer in the column to the right.**						
1.	**The National bird of South Africa is the …** 1) Rosyfaced Lovebird (parrot) 2) Laughing Dove 3) Rock Pigeon 4) African Fish Eagle 5) Blue Crane	1	2	3	4	5	46
2.	**Which one of the following bird species is on the endangered list?** 1) Rosyfaced Lovebird 2) Laughing Dove 3) Rock Pigeon 4) Crowned Lapwing/Plover 5) Blue Crane	1	2	3	4	5	47
3.	**Which one of the following statements about birding tourism is <u>not</u> true?** 1) It is a major profitable activity in South Africa 2) It causes trampling of the environment 3) It draws millions of visitors to different sites across the country 4) It generates millions of dollars in foreign exchange earnings 5) It causes positive relations between South Africans and tourists	1	2	3	4	5	48
4.	**Which one of the following environmental impacts would have the <u>worst</u> effect on birds?** 1) Litter 2) Loss of habitat 3) Air pollution 4) Soil erosion 5) Noise pollution	1	2	3	4	5	49
5.	**Ecology is the study of the relationships between plants and animals and their environments. Which of the following would affect the ecology of birds <u>most</u>?** 1) Different bird species occurring together 2) Mating between some bird species 3) The presence of cattle 4) To destroy the habitat of birds 5) The presence of bird-watchers	1	2	3	4	5	50
6.	**A scarce bird (e.g. Cape Weaver) is most likely to become extinct (die out) in the area, because of:** 1) Competition with other weavers 2) Warming of the area where they live 3) Pollution limiting their reproduction 4) The destruction of their habitat (the reedbeds where they live) 5) The limiting of their food supply due to acid rain	1	2	3	4	5	51
7.	**Environmental problems are a threat to:** 1) Mostly water birds 2) Only pigeons living in cities 3) Only endangered bird species 4) Mostly birds living in tropical areas 5) All living things in the world	1	2	3	4	5	52

8.	**Killing birds such as raptors/vultures that prey on other animals or eat meat from carcasses:** 1) Is necessary and should be done 2) May increase the number of other animals 3) Does not affect other animals in the area 4) May decrease the number of other animals 5) Will help protect the environment	1	2	3	4	5	53
9.	**The Dodo, a bird species that no longer exists, is:** 1) Protected 2) Endangered 3) Abundant 4) Extinct 5) Wild game  *The Dodo*	1	2	3	4	5	54
10.	**In which of the following habitats would you expect a high diversity of bird species?** 1) Wattle plantation 2) Golf course 3) Old lands previously used for agriculture 4) Natural grassland 5) Maize field	1	2	3	4	5	55
11.	**The conservation status of the Tawny Eagle (*a bird of prey that is found in Gauteng*) is 'vulnerable', indicating a decline in their numbers. Which action will <u>not</u> improve their numbers?** 1) Improving their habitat (the area where they live) 2) Protecting indigenous savanna trees, where they can breed and eat 3) Allowing bird hunting during the hunting season 4) Stopping bird poisoning in natural areas 5) Keeping rivers unpolluted	1	2	3	4	5	56
12.	**South Africa has more than …… bird species. (Indicate the closest number)** 1) 1 250 2) 950 3) 450 4) 371 5) 171	1	2	3	4	5	57
13.	**Which item is <u>not</u> typical of a bird-watcher's behaviour?** 1) The bird's welfare is the primary concern of the bird-watcher 2) Birds must not be chased 3) Bird habitat must not be damaged 4) Audio recordings of bird songs should be played loudly to attract certain bird species 5) Rare birds and birds that are breeding should be treated with extra care	1	2	3	4	5	58



C3: KNOWLEDGE: INTERPRETATION

→ ***Tawny Eagle***
'Tawny' refers to the tan or rusty brown colour of the eagle. It occurs throughout South Africa, including Gauteng!

Interpret the pictures and then answer the questions.
Circle the correct answer.

1. **What is the main cycle illustrated in this picture?**
   1) Food cycle
   2) Nitrogen cycle
   3) Carbon cycle
   4) Water cycle

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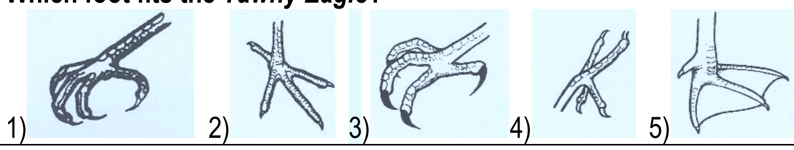
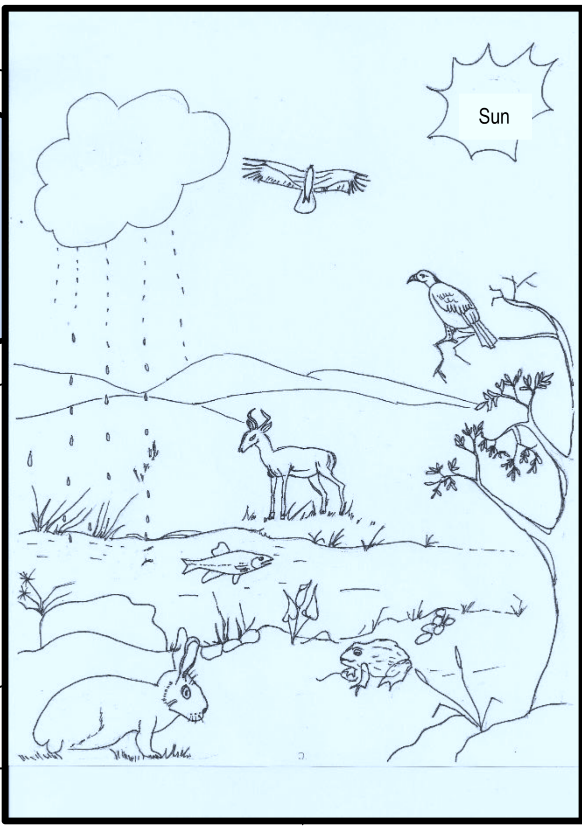
2. **Which foot fits the *Tawny Eagle*?**



60



The picture shows a *Tawny Eagle* perched on top of a tall tree in its natural habitat (Grassland intermixed with trees). The *Tawny Eagle* is a bird of prey but it can also steal the food from other birds or animals. It would also eat meat from carcasses.

3. **In which habitat in Gauteng would you expect to find the *Tawny Eagle*.**
   1) Roofs of high buildings
   2) Wetlands
   3) Forests
   4) Grassland
   5) Savanna (grassy plains with a few trees)

61

4. **Which of the following will be the main food of the *Tawny Eagle*?**
   1) Fish
   2) Frog
   3) Hare
   4) Impala
   5) All of the above

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5. **Based on its eating habits, the *Tawny Eagle* is a ...**
   1) Omnivore
   2) Carnivore
   3) Fish eater
   4) Herbivore
   5) Seed eater

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6. **Which one of the following characteristics do <u>not</u> match a bird of prey?**
   1) Excellent eyesight
   2) Hooked beak
   3) Long neck
   4) Wide, muscular wings
   5) Feet with hooked claws

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D:	ENVIRONMENTAL AND AVI-VALUES Please state your level of agreement with each statement below (Mark only ONE response to each statement)	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	
1.	I save water because it is important for the survival of birds	1	2	3	4	5	65
2.	I save electricity because it could decrease air pollution, which endangers many bird species	1	2	3	4	5	66
3.	Various birds species will die out if we do not live in tune with nature	1	2	3	4	5	67
4.	I enjoy trips to the countryside in order to observe birds in their natural habitat	1	2	3	4	5	68
5.	Sitting at the edge of a pond watching birds in flight is enjoyable	1	2	3	4	5	69
6.	It is interesting to know what kinds of birds live close to ponds or rivers	1	2	3	4	5	70
7.	Industrial smoke from factories that kills birds makes me angry	1	2	3	4	5	71
8.	It upsets me to see that bird habitats are destroyed to put up new buildings	1	2	3	4	5	72
9.	We must set aside areas to protect endangered birds species	1	2	3	4	5	73
10.	Society must continue trying to solve even the biggest environmental problems that affect birds	1	2	3	4	5	74
11.	Humans have the right to change natural bird habitats as they see fit	1	2	3	4	5	75
12.	We need to clear bird habitats in order to grow crops	1	2	3	4	5	76
13.	We should remove garden weeds to help flowers grow	1	2	3	4	5	77
14.	Our planet has unlimited resources	1	2	3	4	5	78
15.	Nature is always able to restore itself	1	2	3	4	5	79
16.	We must build more roads so that people can easily travel to the natural attractions	1	2	3	4	5	80
17.	Our plants, birds and animals are of economic importance and need to be protected	1	2	3	4	5	81
18.	Worrying about birds often holds up development projects (e.g. building houses, shopping centres, etc.)	1	2	3	4	5	82
19.	People worry too much about pollution	1	2	3	4	5	83
20.	Human beings are more important than birds	1	2	3	4	5	84

E1:	**BEHAVIOUR: INTENTION** *How you* ***THINK*** *about the environment?* **Please state what is true about you with each statement below (Mark only ONE response to each statement)**	Not at all true of me	Slightly true of me	Somewhat true of me	Very true of me	Extremely true of me	
1.	I would be willing to stop buying some products to save the lives of birds	1	2	3	4	5	85
2.	I would be willing to save electricity if it could avoid killing birds	1	2	3	4	5	86
3.	I would be willing to save water because it is important for the survival of birds	1	2	3	4	5	87
4.	I would be willing to give my own money to protect bird habitats	1	2	3	4	5	88
5.	I would be willing to ride the bus / walk to more places if it could save more birds	1	2	3	4	5	89
6.	I would be willing to separate my family's rubbish for recycling if it could preserve bird habitats	1	2	3	4	5	90
7.	I would be willing to give my own money to help protect wild birds	1	2	3	4	5	91
8.	I would be willing to turn off the water while I wash my hands if it could preserve bird habitats	1	2	3	4	5	92
10.	I would be willing to share environmental information to inform people about birds and their habitats	1	2	3	4	5	93
11.	I would be willing to motivate people to support environmentally responsible birding tours	1	2	3	4	5	94
12.	I would be willing to explain to people who do not recycle how it could help bird-life	1	2	3	4	5	95
13.	I am willing to buy a bird book to assist me in identifying birds	1	2	3	4	5	96
14.	I am willing to buy a bird book to learn more about birds and bird habitats	1	2	3	4	5	97
15.	I am willing to talk to my teachers about a bird club at school	1	2	3	4	5	98
16.	I am willing to join a local bird-watching club	1	2	3	4	5	99
17.	I would be willing to put up a bird house or a bird feeder near my home	1	2	3	4	5	100
18.	I would be willing to go on a bird-watching tour in my area	1	2	3	4	5	101
19.	I would be willing to go on a bird-watching tour in a nature reserve	1	2	3	4	5	102
20.	I would like to visit the local zoo to learn more about birds	1	2	3	4	5	103

E2:	**BEHAVIOUR AND THE ENVIRONMENT** *What do you DO about the environment?* **Please state your action with each statement below (Mark only ONE response to each statement)**	Never	Seldom	Sometimes	Often	Always	
1.	I have talked to someone about pollution that causes destruction of bird habitats	1	2	3	4	5	104
2.	I have talked to someone about how to limit environmental problems that affect bird habitats	1	2	3	4	5	105
3.	I do turn off the water while I brush my teeth to conserve water because it is important for the survival of birds	1	2	3	4	5	106
4.	I have asked someone not to buy products that can cause harm to birds	1	2	3	4	5	107
5.	I have asked someone to recycle some of the things we use to limit production of waste that is bad for bird-life	1	2	3	4	5	108
6.	I have asked others what I can do to help create a healthy environment that is good for bird-life	1	2	3	4	5	109
7.	I read stories that are mostly about birds	1	2	3	4	5	110
8.	I have talked to someone about a bird-watching club at school	1	2	3	4	5	111
9.	I throw rubbish out of the window while driving with someone	1	2	3	4	5	112
10.	I feed birds in our garden	1	2	3	4	5	113
11.	I have visited a bird park	1	2	3	4	5	114
12.	I have been on a bird-watching tour in a nature reserve	1	2	3	4	5	115
13.	I have visited the local zoo to learn more about birds	1	2	3	4	5	116
14.	I have visited the local museum to learn more about birds	1	2	3	4	5	117

Thank you very much for your time and for participating in this survey!

APPENDIX C: Permission from the Gauteng Department of Education

GAUTENG PROVINCE
Department: Education
REPUBLIC OF SOUTH AFRICA

For administrative use: **Reference no. D2014 / 395 G**

GDE GROUP RESEARCH APPROVAL LETTER

Date:	**3 April 2014**
Validity of Research Approval:	**3 April 2014 to 3 October 2014**
Name of Supervisor/s:	**Professor D.H. Tustin**
Name/s of Researchers	**Conradi N.; Van Zyl L. and Van Zyl C.**
Address of Supervisor:	**6 Villa de Palma**
	Brummeria
	0184
Telephone Number:	**012 429 3156 / 072 672 9153**
Fax Number:	**012 429 3170**
Email address:	**Tustidh@unisa.ac.za; conran@unisa.ac.za; vzylle@unisa.ac.za; vzylc@unisa.ac.za**
Research Topic:	**The development and evaluation of a sustainable avitourism (bird tourism) intervention programme aimed at secondary school learners within Gauteng**
Number and type of schools:	**THIRTY-SIX Secondary Schools**
District/s/HO	**Johannesburg North; Tshwane North; Tshwane South and Tshwane West**

Re: Approval in Respect of Request to Conduct Research

This letter serves to indicate that approval is hereby granted to the above-mentioned researcher to proceed with research in respect of the study indicated above. The onus rests with the researcher to negotiate appropriate and relevant time schedules with the school/s and/or offices involved to conduct the research. A separate copy of this letter must be presented to both the School (both Principal and SGB) and the District/Head Office Senior Manager confirming that permission has been granted for the research to be conducted.

2014/04/04

Making education a societal priority

Office of the Director: Knowledge Management and Research
9th Floor, 111 Commissioner Street, Johannesburg, 2001
P.O. Box 7710, Johannesburg, 2000 Tel: (011) 355 0506
Email: David.Makhado@gauteng.gov.za
Website: www.education.gpg.gov.za

The following conditions apply to GDE research. The researcher may proceed with the above study subject to the conditions listed below being met. Approval may be withdrawn should any of the conditions listed below be flouted:

1. *The District/Head Office Senior Manager/s concerned must be presented with a copy of this letter that would indicate that the said researcher/s has/have been granted permission from the Gauteng Department of Education to conduct the research study.*
2. *The District/Head Office Senior Manager/s must be approached separately, and in writing, for permission to involve District/Head Office Officials in the project.*
3. *A copy of this letter must be forwarded to the school principal and the chairperson of the School Governing Body (SGB) that would indicate that the researcher/s have been granted permission from the Gauteng Department of Education to conduct the research study.*
4. *A letter / document that outlines the purpose of the research and the anticipated outcomes of such research must be made available to the principals, SGBs and District/Head Office Senior Managers of the schools and districts/offices concerned, respectively.*
5. *The Researcher will make every effort obtain the goodwill and co-operation of all the GDE officials, principals, and chairpersons of the SGBs, teachers and learners involved. Persons who offer their co-operation will not receive additional remuneration from the Department while those that opt not to participate will not be penalised in any way.*
6. *Research may only be conducted after school hours so that the normal school programme is not interrupted. The Principal (if at a school) and/or Director (if at a district/head office) must be consulted about an appropriate time when the researcher/s may carry out their research at the sites that they manage.*
7. *Research may only commence from the second week of February and must be concluded before the beginning of the last quarter of the academic year. If incomplete, an amended Research Approval letter may be requested to conduct research in the following year.*
8. *Items 6 and 7 will not apply to any research effort being undertaken on behalf of the GDE. Such research will have been commissioned and be paid for by the Gauteng Department of Education.*
9. *It is the researcher's responsibility to obtain written parental consent of all learners that are expected to participate in the study.*
10. *The researcher is responsible for supplying and utilising his/her own research resources, such as stationery, photocopies, transport, faxes and telephones and should not depend on the goodwill of the institutions and/or the offices visited for supplying such resources.*
11. *The names of the GDE officials, schools, principals, parents, teachers and learners that participate in the study may not appear in the research report without the written consent of each of these individuals and/or organisations.*
12. *On completion of the study the researcher/s must supply the Director: Knowledge Management & Research with one Hard Cover bound and an electronic copy of the research.*
13. *The researcher may be expected to provide short presentations on the purpose, findings and recommendations of his/her research to both GDE officials and the schools concerned.*
14. *Should the researcher have been involved with research at a school and/or a district/head office level, the Director concerned must also be supplied with a brief summary of the purpose, findings and recommendations of the research study.*

The Gauteng Department of Education wishes you well in this important undertaking and looks forward to examining the findings of your research study.

Kind regards

Mlelledo ....

Dr David Makhado
Director: Education Research and Knowledge Management

DATE: ...2014/04/04.......................................

Making education a societal priority

Office of the Director: Knowledge Management and Research
9th Floor, 111 Commissioner Street, Johannesburg, 2001
P.O. Box 7710, Johannesburg, 2000 Tel: (011) 355 0506
Email: David.Makhado@gauteng.gov.za
Website: www.education.gpg.gov.za

APPENDIX D: Ethical clearance

UNISA | bureau of market research

TO: Ms N Conradie
Department of Transport Economics Logistics and Tourism
University of South Africa

FROM: BMR Research Ethics Committee (REC)
Bureau of Market Research
TvW Building

DATE: 17 April 2014

APPLICATION FOR ETHICAL CLEARANCE:
DEVELOPING A SUSTAINABLE AVITOURISM INTERVENTION PROGRAMME
AT SECONDARY SCHOOLS IN GAUTENG (RF005.4)

The BMR Research Ethics Committee (REC) has reviewed your research proposal on the development and evaluation of a sustainable avitourism intervention programme aimed at secondary school learners within the Gauteng Metropolis. The REC is satisfied that the proposal has been approved by the Gauteng Department of Education and in principle meets the necessary research ethics requirements. Also, the research methodology is regarded as reliable with a low risk of causing any harm to under-aged participants or the institution. Accordingly, you are granted permission to proceed with the study provided that:

(i) the research principles as outlined in the Unisa and BMR Research Ethics Policies are adhered to throughout the entire project

(ii) the research instrument be amended to a more confined focus on avitourism measuring the awareness, knowledge, sensitivity, values and actual and intended change behaviour of under-aged learners.

(iii) the consent of the principal/school governing body/parents and children be obtained to comply with the research ethics involving under-aged individuals. In this regard, also ensure that the interviews with learners take place in the presence of adults (teachers and/or research team members).

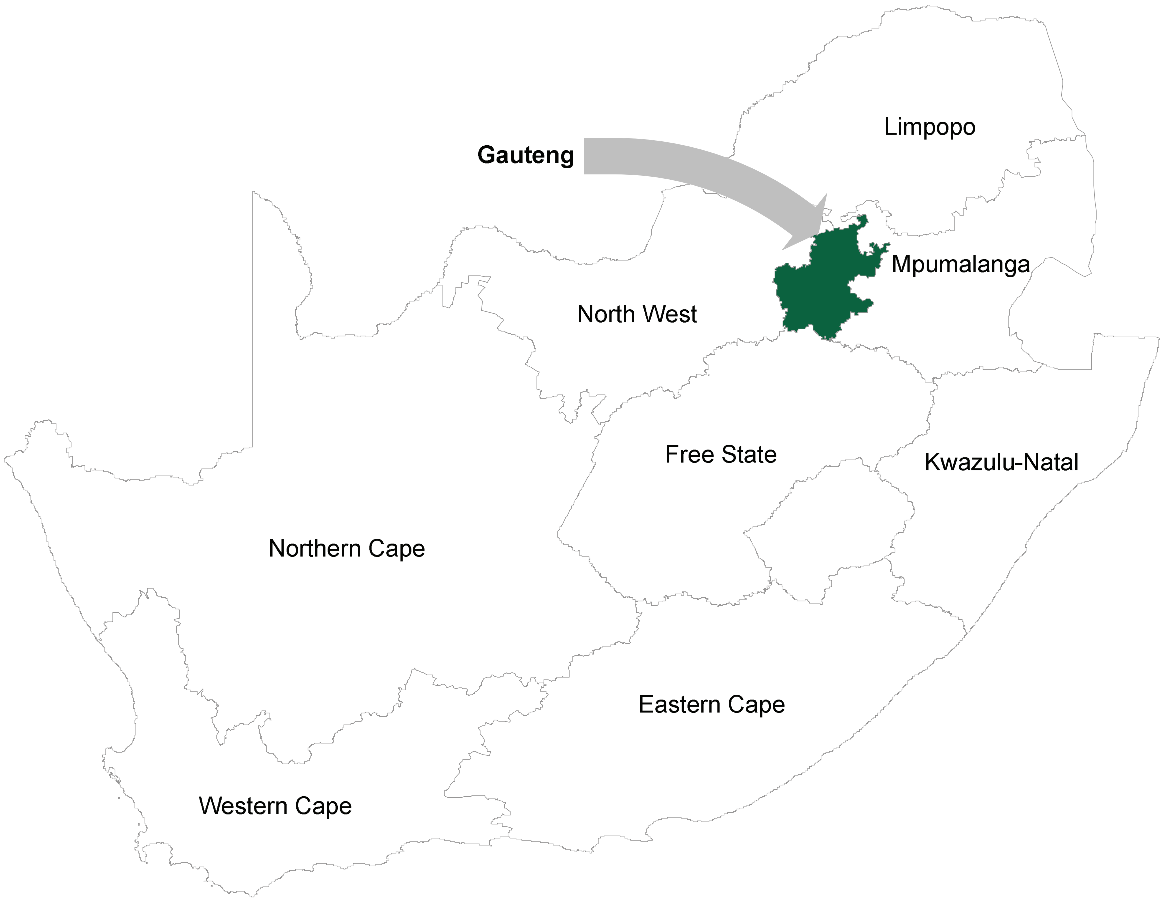
To adhere to the conditional ethical clearance, you are requested to submit the final sampling plan and research instrument to the BMR REC at the time when such activities are due. Hereafter, you will be granted permission to proceed with the research if all preconditions outlined above are satisfactorily adhered to.

Regards

Prof DH Tustin
Head: Bureau of Market Research

APPENDIX E: Maps

E1: Map: South Africa indicating the location of Gauteng

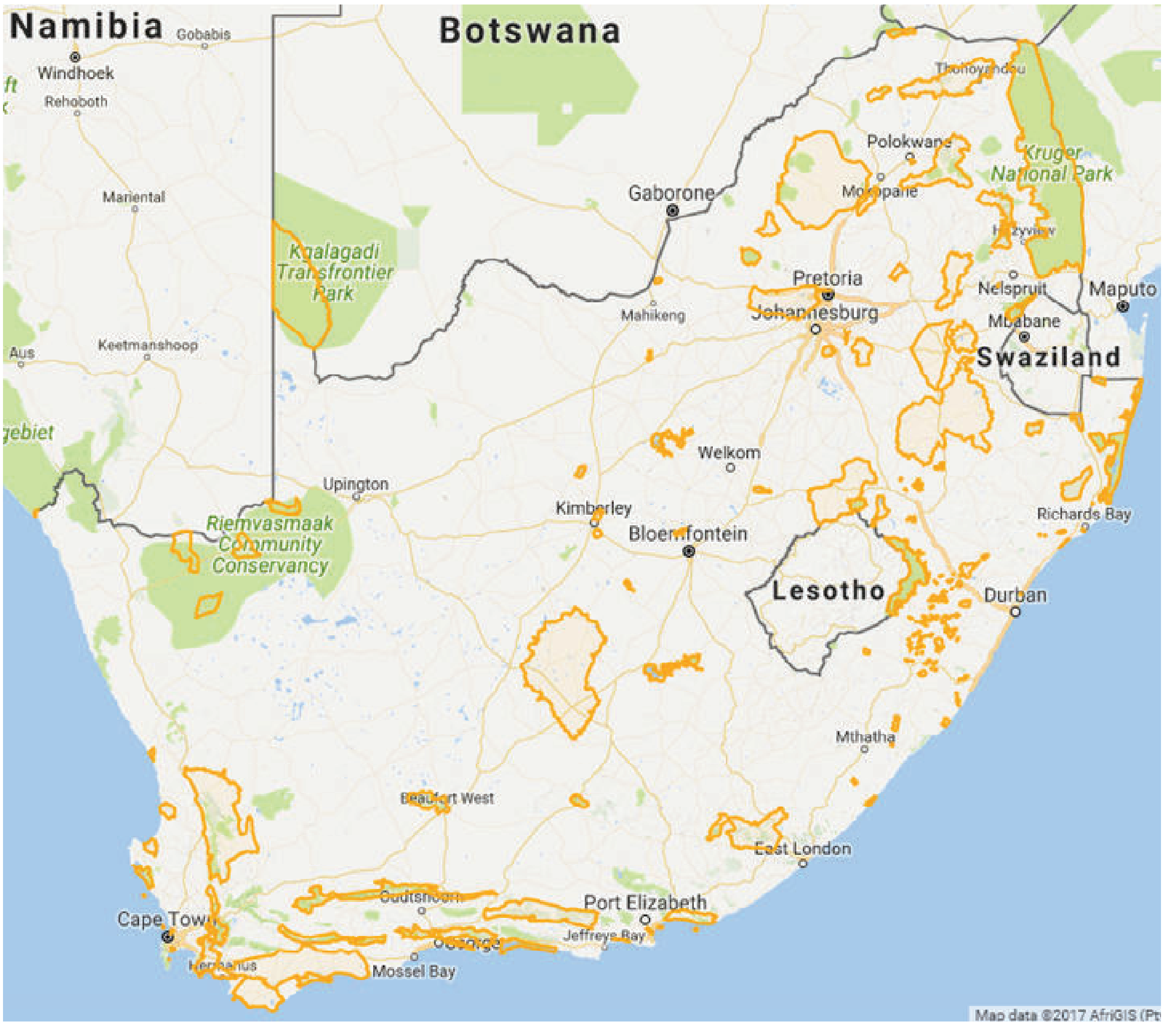


Source: Author's own compilation

E2: Map: Gauteng school districts

Source: Author's own compilation

E3: Map: Important Bird Areas (IBAs) in South Africa



* IBAs indicated in yellow

Source: BirdLife South Africa, 2017

APPENDIX F: Practical example of the literacy model for sustainable avitourism