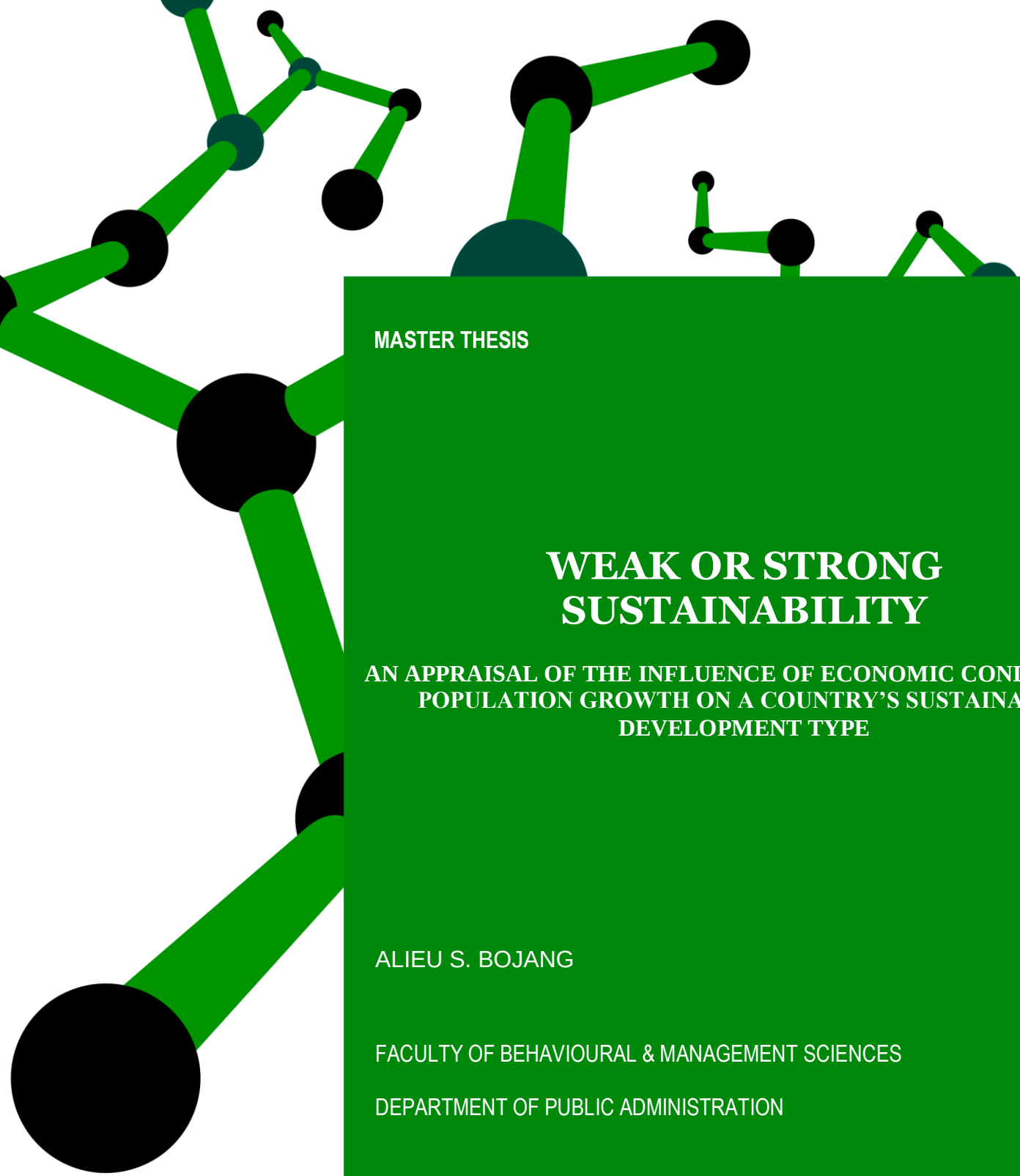

MASTER THESIS

WEAK OR STRONG SUSTAINABILITY

AN APPRAISAL OF THE INFLUENCE OF ECONOMIC CONDITION & POPULATION GROWTH ON A COUNTRY'S SUSTAINABLE DEVELOPMENT TYPE

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by

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Abstract

The main purpose of this study is to find out the extent to which population growth and the economic condition of a country, have an influence on the type of SD the country follows. Despite ubiquitous calls for development to be sustainable, scholars still disagree on the meaning, form, and how countries should achieve sustainability. While others call for a strong type of sustainable development, opponents call for a weak sustainability type. This leaves countries in a state of quandary. This thesis accentuated that instead of focusing on the 'how', we should rather seek to find out 'what' influences the SD of a country; as only then we can find an answer to how we can achieve sustainability. Since sustainable development is intertwined with economic development, we reckon to find out the influence of economic conditions on the type of SD that countries follow. Notwithstanding, this question remains lingering and untested in academia. Another factor that is assumed to affect SD is population growth and hence taken as the second variable in this study. However, since countries differ in their economic level, we deemed it necessary to find out if the discrepancy in their economic condition will relate to a certain type of sustainable development. Ergo, we adopted a case study design to look at the relationship between population growth and economic conditions and the type of SD in countries that are most different in their economic conditions: developed and least developed countries (LDCs). The results showed that population growth and the economic condition of a country influence the type of SD that a country follows. The extent of which is strong in some countries and very weak in others. As for population, it only influences the increase in demand and consumption of natural resources and ecosystem services in LDCs and not developed countries.

Keywords: sustainable development, weak sustainability, strong sustainability, population growth, economic conditions, developed countries, least developed countries, genuine savings, ecological footprint.

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Abbreviations

BC	Biocapacity
EF	Ecological Footprint
EVI	Economic Vulnerability Index
FDI	Foreign Direct Investment
GS	Genuine Savings
HAI	Human Asset Index
HDI	Human Development Index
LDCs	Least Developed Countries
NGO	Non Governmental Organization
SD	Sustainable Development
SS	Strong Sustainability
SSS	sub-Saharan Africa
UK	United Kingdom
US	Unsustainability
USA	United States of America
WS	Weak Sustainability
GNI	Gross National Income
GHA	Global Hectares
UN	United Nations
WB	World Bank

CHAPTER 1: INTRODUCTION

1.1. Background Statement of the Problem

The human population is projected to increase by 2 billion persons in the next 30 years; from 7.7 currently to 9.7 billion in 2050 (UN Report, 2020). This means that there will be an increase not only in the population but in the production and consumption of goods and services, an increase in the demand for housing, and so on. The effects of these might only result in the depletion of natural resources and the environment. Thus, we could see and hear frequent reports in daily media on environmental pollution, climate change, ozone layer depletion, staggering temperatures, biodiversity loss, continuing extinction of spices, etc; which is claimed to be the results of human economic activities. This led to a widespread environmental awakening around the world, which calls for concern on the question of how long the earth can sustain and what to do with the growths? Some extremists even advocate for non-development as the solution. However, this is a huge misunderstanding as one is intrigued to ask how the basic needs of the people can be met without development? What we can all agree on, is the fact that economic development is a necessity for the survival of mankind, however, it should not be destructive. This forms the ground in the report of the Brundtland Commision (1987), where sustainable development is considered as being economic development; without which, countries cannot meet the basic needs of their people. Thus economic growth becomes an obligation on states for meeting the basic needs of their society. Sustainable development advocates sought to overcome this problem by focusing on ways in which economic growth could occur without damaging the environment.

Ultimately, the concept of 'sustainable development' (SD) emerged over the years as the overarching environmental doctrine in the international agenda (Egelston, 2013). Notwithstanding, scholars, and policymakers, still disagree on its meaning and/or concept, as Egelston (2013) claimed 57 uses of the term have been reported by some authors. What they all agree on is the fact that development has to be sustainable, but how and in what ways to achieve it, is contested and remains a discourse (Neumayer, 2013).

Eventually, this led to a series of United Nations (UN) conferences on the nexus between humans and the environment. In 1972, a UN Conference on the Human Environment was held in Stockholm, where the environment was turned into a major international issue (Barua & Khataniar, 2015; Neumayer, 2013; Egelston, 2012). After a series of conferences, in 1987, the World Conservation Strategy was launched to address environmental issues where the term "sustainable development" was coined for the first time (Barua & Khataniar, 2015, p.5). Eventually, three years later, the World Commission on Environment and Development (WCED) was established with Ms. Brundtland as the chairman. The commission published its report called *Our Common Future*, which came out with the popular and 'widely accepted' definition of the term sustainable development as "the development that meets the needs of the present without compromising the ability of the future generation to meet their needs" (Brundtland Commission, 1987, p.41). This definition according to Barua & Khataniar (2015), means that the environment is a prerequisite for development. As such sustainable development intertwines economic growth and environmental protection. Unfortunately, this is overlooked by many environmental advocates who only have concerns for the ecosystem and not the needs of the people.

This discord resulted in the rise of two main types of sustainability in the burgeoning literature of sustainable development namely; weak and strong sustainability (Barua & Khataniar, 2015; Neumayer, 2013). The former calls for utilizing the environment in view of counterbalancing investments in basic human needs, while the latter advocates for non-substitutability of natural and human capital[1] (Neumayer, 2013). Implicit in these statements, is the fact that the main debate about sustainable development is whether or not natural capital should be preserved or substituted by other forms of capital. The former is a choice for strong sustainability while the latter is opting for a weak sustainable development (Dietz & Neumayer, 2007).

Egelston (2012), in highlighting the question of the political form that SD takes, accentuated that "actors that do not adhere to the principles of sustainable development are not subject to any

[1] This will be explained more in details in chapter 2.

disciplinary action from the rest of the international community" (Egelston, 2012, p29). Notwithstanding, it should be noted that from 1992 onwards if not all but most of the countries have signed sustainable development policy documents like agenda 21, where they are monitored, have frequent conferences to follow up to the stipulated policies (UN General Assembly, 1992). This makes countries obliged to the normative principles of sustainability. Thus the only decision left to them is choosing how and what ways/strategies to adopt in pursuit of sustainable development. Thus, we argued that instead of focusing on the 'how', we should find out 'what' influences the SD of a country; as only then we can find an answer to how we can achieve sustainability. The question that then emerges is, what condition(s) will influence the strategies that countries choose to achieve SD? This is the moral behind this study.

Since we learned from the above statements that SD is viewed and defined in terms of economic development, one is thus intrigued to find out whether the economic conditions of countries have an influence on their type of sustainable development and to what extent? Notwithstanding, this question remains lingering and untested in academia. Therefore, this thesis argued that there is a need to fill this research gap by scholars and researchers; to find out the relationship between the economic conditions of a country and the type of sustainable development that they are following. The finding/answer to this argument will not only help researchers and policymakers in making decisions related to sustainable development and economic conditions of a country; but will also open the door for further research. Another factor that might presumably affect sustainability is population growth. It is reasonable to assume that an increase in the population of a country would lead to an increase in their demand for and consumption of natural resources and ecosystem services. Hence, it is worth looking at the association between population growth of a country and their SD type; to ascertain if an increase or decrease in the population of a country will relate to an increase/decrease in their demand for and consumption of natural resources. Ergo, this thesis seeks to analyze the extent of the influence of economic condition and population growth on a county's type of sustainable development. To do this, we have developed the diagram below in figure İ to illustrate the relationship between these factors.[2] As

[2] The conceptualisation and relationship between these variables will be explained more under methodology on page 19 - 20.

depicted in the diagram, we intend to find out the influence of and the correlation between population growth and the economic condition of a country in relation to the type of sustainable development they follow.[3] As the diagram illustrates, we argue that there is a relationship between the economic conditions of a country and the type of sustainable development they follow. Similarly, we argue that there is a relationship between the population growth of a country and its type of sustainable development. Nonetheless, it should be noted that though there might be a relationship between population growth and economic conditions of a country, however, that is beyond the scope of this study and thus a recommendation for future research. Therefore, this study seeks to find out 'separately' the influence of economic conditions and population growth on the type of sustainability a country follows. That is, we are taking these two variables independent of each other, we are not looking at the relationship between them and their combined effects on a country's sustainable development type. Ergo, the main research question of this study is; *to what extent population growth and economic conditions of a country influence the type of sustainable development the country follows?*

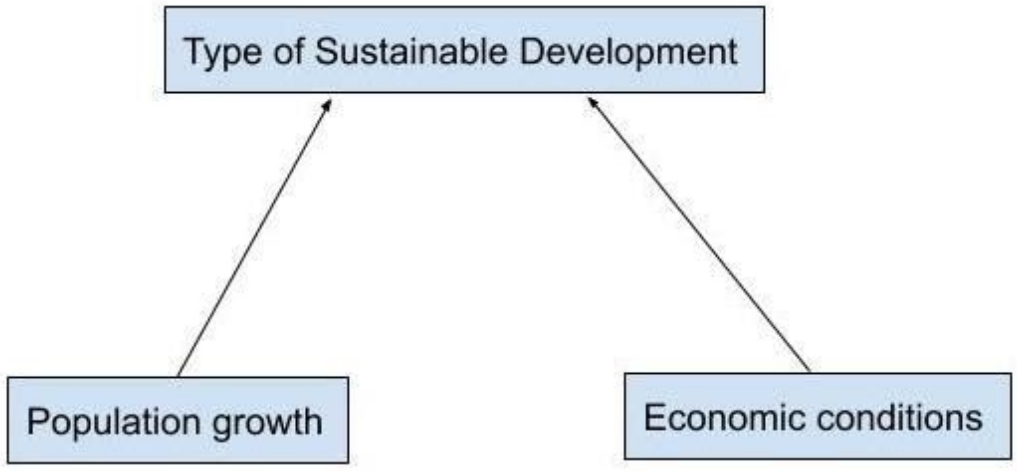


Figure İ The relationship between the population growth & economic conditions of a country and the type of sustainable development the country follows.

[3] See footnote on page 7 for the meaning of follow in this regard.

Furthermore, as this thesis is about the sustainable development of 'countries' in relation to their economic condition and population growth, it should be noted that the economic conditions of countries differ. We could see on the daily news reports; where the protection of the environment is on top of the development agenda in developed countries, developing and/or least developed countries, on the other hand, are concerned about meeting their basic human needs. Hence, there is a need to look into different categories of countries. This will help us in finding out if the economic disparity of countries matters for the type of sustainable development they follow. That is whether there will be a deviation in the type of SD that each category follows? Will a specific category of countries follow a specific type? Which one will follow WS or SS? The only way to answer these questions is to conduct a comparative case study that encompasses different categories of countries.

1.2. Aims and Objectives of the Study

This study seeks to fill the gap in research on the nexus between population growth, economic conditions of a country, and their type of sustainable development. Thus, the thesis has three main aims. First, categorize countries into different groups (developed and least developed). Second, measure the development type of the selected countries if it is weak or strong sustainability. Finally, find out why one category follows a particular type and explore to what extent the economic conditions and population growth in the country are the variables influencing this type of sustainable development.

One is tempted to ask if the type of SD that countries follow, are of their own choice or influenced by other external factors such as international organizations, NGOs, donors, pressure groups, etc. However, the aim of this thesis is not to find out an answer to this. Furthermore, there might be several factors rather than economics, such as environmental awareness in the country, the governance system, technological development, etc., that can explain why a country's development is related to a particular type of sustainability. However, due to limited time constraints, this thesis will not be able to conduct all that research in one study. Thus, rather

than causation, this study seeks to analyze separately, the correlation between population growth, the economic condition of a country, and the type of sustainability they follow.

1.3. The Relevance of the Study

This research, for the most part, will present one of the few studies on the nexus between the economic situation of a country and the type of sustainability the country follows. The findings/answers to the research question and arguments of this thesis will not only help researchers and policymakers in making decisions related to a country's economic condition, her population, and the type of sustainable development it follows; but will also open the door for further research. In addition to the lack of scientific knowledge on this matter, previous research has only focused on one category of countries (i.e., developing countries). For example, the study by Barua and Khataniar only focused on emerging Asian Economies. Bissoon's (2017) work only centered on sub-Saharan African countries. There have not been studies on the relationship between developed countries and their type of sustainable development. Thus, by filling this gap in research, this study will be the first work that has studied the correlation between the economic conditions of developed countries and the type of sustainability they follow. By encompassing both developed countries of Europe and the Americas and the least developed countries of Africa and Asia, the results of this study will have more external validity than previous research. Furthermore, the results will help not only scholars but policymakers to better understand the correlation between population growth and economic status with sustainable development and use the knowledge gained in deciding on key sustainability policies.

This thesis is structured as follows: the next chapter discusses the general theoretical body of knowledge on sustainable development and presents the theoretical choices. The following chapter presents the methodological approach. The results are described in chapter 4 and chapter 5 presents the general discussion and answer to the research question.

CHAPTER 2: LITERATURE REVIEW

This chapter provides the theoretical framework regarding the approach taken in this study. The first section of the chapter presents the current body of literature regarding the core concepts included in this topic and is structured as follows: meaning and concept of sustainable development; the type of sustainable development that countries follow; the indicators of sustainable development; and the possible factors that influence the type of SD that a country follows. This will provide us the current knowledge on the burgeoning literature of SD in general and allow us to find out: their strength and weakness; identify the gap and conflict in the research, and help us to conceptualize and better explain our 3 variables model depicted in the diagram on figure İ. It should be noted that the variables in this study are about SD in relation to 'countries.' That is the study is about SD of countries (not companies, municipalities, etc) in relation to their population growth and economic conditions. Thus, we are not looking at SD in its entirety, but only literature that looked at the pathways, types of SD that countries follow to ascertain if it's weak or strong. Ergo, the second section of this chapter looks at the state of the art body of knowledge on the classification of countries.

2.1. SUSTAINABLE DEVELOPMENT

2.1.1. What is Sustainable Development?

As mentioned earlier, scholars and policymakers still disagree on the meaning of the term 'sustainable development.' According to Egelston (2012), 57 uses and/or definitions of the term have been reported by some authors. Nonetheless, what they all agree on is the fact that development has to be sustainable, but how and what this sustainability entails, is contested and remains a discourse (Egelston, 2012). However, the widely accepted definition of the term sustainable development was coined by the Brundtland Commission as "the development that meets the needs of the present generation without compromising the ability of the future generation to meet their needs" (Brundtland Commision, 1987, p.41). This definition according to Barua & Khataniar (2015), means that the environment is a prerequisite for development. As

such sustainable development intertwines economic growth and environmental protection. “it seeks to ameliorate poverty, yet simultaneously to conserve the natural resources that undoubtedly will be consumed in the process of improving the quality of life in the developing countries, particularly in the least developed countries” (Egelston, 2012, p26). Thus, as argued by Coenen (2005), there are three general pillars of SD: ensuring economic development; improving the rational use of natural resources; and enhancing social well-being. However, how to achieve this development remains under consideration and a heated debate among advocates and scholars. Coenen (2005) further noted that SD is the balancing of various types of capital so that they do not hold back each other. He suggested that with the ability to find the right measures, an investment in human capital compared with investment in other types of capital will give the most economic return. Implicit in these statements, is that the main concern about SD is whether or not natural capital should be preserved or substituted by other forms of capital.

2.1.2. What are the Types of Sustainable Development that Countries Follow?

As accentuated earlier, the fundamental debate concerning sustainable development is between two paradigms, about whether we should choose to adopt a *strong* or a *weak* conception of sustainability.

Weak sustainability (WS)

The root of WS stems from the neoclassical economist, based on the belief that what matters for future generations is only the total aggregate stock of *capital*[4]*: human-made*[5]*; and natural capita*[6] (Barua & Khataniar, 2015; Neumayer, 2013; Egelston, 2012; Bissoon, 2017). In a simpler term, according to WS, whether the current generation uses up non-renewable resources, degrades the environment, or pollutes the atmosphere, does not matter as long as enough roads, schools and universities, hospitals, machinery, etc. are built, in compensation for degrading the environment (Barua & Khataniar, 2015; Neumayer, 2013; Bissoon, 2017). For them, natural capital and

[4]Capital here is defined as a stock or item that provides utility. See (Neumayer, 2013)
[5]Is what has conventionally been embraced under capital, like factories, schools, infrastructure etc. Neumayer, op. cit
[6] Natural capital is nature in its entirety (non-renewable and renewable resources, plants, species, ecosystems, etc.) that can provide human beings with utility. Neumayer, op. cit

manufactured/ human-made capital are seen as essentially substitutable (Barua & Khataniar, 2015; Neumayer, 2013; Egelston, 2012; Bissoon, 2017). That is to say, 'it's okay to destroy the forest, sell the woods, generate income, and invest the generated income into other human needs.' This opted Neumayer (2013, p.22) to refer to WS as the 'substitutability paradigm.' Thus a country only needs to be concerned about the value of her aggregate stock of capital and not changes in any individual forms of this capital.

Strong Sustainability

On the contrary, advocates of strong sustainability (SS), see the environment as more than just a mere stock of economic potential and that natural capital (environment) is regarded as a non-substitutable in the production of consumption goods (Barua & Khataniar, 2015; Neumayer, 2013; Bissoon, 2017). That is, human-made capital cannot replace natural capital such as the ozone layer. This is due to the concern that there is uncertainty and lack of knowledge on the form of natural capital; we are not sure of what the effects of damaging it will be in the future (Dietz & Neumayer, 2007). Thus, SS in general, calls for preserving natural capital in its value term, while some authors see it as preserving some 'critical' forms of natural capital (e.g., ozone layer) that are regarded as non-substitutable (Neumayer, 2013). Therefore, Neumayer (2013, p.25) referred to SS as the 'non-substitutability paradigm.' Nevertheless, he argued that SS does not imply keeping nature as it is, but rather calls for its functions intact. For Vitalis (2003, p.4), SS "can either be translated as maintaining ecological capital intact over time, or restricting environmental degradation above some critical level of resilience beyond which the ecosystem could not recover from shocks or stress."

2.1.3. Indicators of Sustainable Development

The outcome of this scholarly dissension and research was the invention of various indicators and/or frameworks that are used to assess the sustainable development path of a country. Some of the most commonly used indicators are genuine savings, also known as adjusted net savings; green national net product; the system of environmental-economic accounting; the index of sustainable and economic welfare; the ecological footprint; the environmental sustainability

index; the environmental performance index; the environmental vulnerability index, material flows, etc. (Barua & Khataniar, 2015; Neumayer, 2013). This paper, therefore, is about a specific method of sustainability assessment that involves the ideal use of Genuine Savings and Ecological Footprint. We will look at the general concept and/or frameworks of these indicators and then apply them to assess the sustainable development path of The Gambia and Tanzania through a time series data from 2003 to 2012. However, due to prominence and the availability of data, this study will select Genuine Savings and Ecological Footprint for assessing the type of sustainable development in the selected countries.

Genuine Savings (GS)

Otherwise known as Adjusted net Savings that is computed by the world bank, is described as a "theoretically correct measure of WS" (Neumayer, 2013, p132). It is a simple indicator to assess an economy's sustainability, which assumes that capital stock consists of produced capital; human capital; natural capital; and social capital (quality of institutions and networks) (Barua & Khataniar, 2015; Neumayer, 2013; Hanley et al., 2015). This makes it based on the concept of weak sustainability, advocating for complete substitutability between natural and human capital. Hence, it is an extension of the Hartwick rule which "assumed that an economy will be sustainable if savings are superior to the aggregated depreciation of human, man-made and natural capital" (Barua & Khataniar, 2015, p.13). It assesses how the combination of these different forms of capital can produce a stream of wellbeing over time; maintaining the economy-environment nexus (Hanley et al., 2015). Thus, GS is a measure of the yearly changes of a nation's total capital stock (Hanley et al., 2015). It should be noted that "Since wealth is the basis of well-being, then changes in wealth (changes in capital stocks) have consequences for future well-being. It is these changes in wealth that GS seeks to quantify" (Hanley et al., 2015, p.2)

The propositions about GS are: an economy cannot be weakly sustainable if its GS rate is below zero (Neumayer, 2013); negative GS rate indicates weak unsustainability as it indicates that well

being might decline in the future (Neumayer, 2013); and a positive GS rate is deemed to indicate weak sustainability (Bisson, 2017; Barua & Khataniar, 2015).

Ecological Footprint (EF)

A physical indicator of sustainability that does not take on any form of monetary valuation (Neumayer, 2013). EF focuses on environmental sustainability instead of inter-generational capital balance, which relates it to strong sustainability (Neumayer, 2013; Barua & Khataniar, 2015). It is used to interpret all the ecological impacts of human economic activities into the area required to provide the resources (Neumayer, 2013). That is, EF assesses "whether humans live within the earth's biocapacity budget" (Barua & Khataniar, 2015. p12). EF only focuses on consumption and thus, it is attributed to the consumer rather than the producer as it is the consumer and not the producer that is responsible for the impact (Neumayer, 2013). For instance, according to Neumayer (2013) resources extracted in the least and/or developing country, but exported to a developed country, counts towards the EF of the developed country.

The main assumption about EF is that if it exceeds the bioproductive land/biocapacity available, then the carrying capacity of the land area is exceeded and thus unsustainable and vice versa (Barua & Khataniar, 2015; Neumayer, 2013). This is called an 'ecological deficit.' Biocapacity is a measure of the ecologically productive land available; the ability of an ecosystem to produce biological materials and to squander the waste products generated by humans (Barua & Khataniar, 2015). Thus, ecological footprint is defined in this study as the demand for and consumption of natural resources and ecosystem services (natural capital), while Biocapacity is defined as the budget/availability and supply of these capitals.[7]

As highlighted earlier, this thesis in general is about the sustainable development of 'countries'. Hence, the below question will look at the current body of knowledge in the literature about the factors that influence the type of sustainable development that countries follow.

[7] The propositions about EF, GS and BC will be explained more in the methodology on page 19-20.

To some extent, we agree with the arguments of WS. First and foremost, as highlighted earlier, SD is intertwined with economic development; in terms of providing basic human needs to the people. Nonetheless, there is a cost to providing these basic human needs. Whereas some countries might have other means of financing these costs, for others the only available source for them is their natural capital. Therefore, since natural capital exploitation is somewhat unavoidable, then the best option is to substitute it with other forms of capital so that their aggregate stock of capital is enough to provide well being for the future generation. If we only keep consuming our natural capital, without investing it in other forms of capital, our future generations will not have enough capital to meet their needs.

Be that as it may, we disagree with WS assertion of 'total' substitutability of natural and human capital, and side with SS that some forms of natural capital (eg. biodiversity, the ozone layer, etc.) are irreplaceable. The extinction of these kinds of capital might lead to some negative consequences in the future for both the environmental and wellbeing. Therefore, rather than conforming to one, scholars should advocate for countries to adopt both paradigms

2.1.4. What Influences the Type of Sustainability that Countries Follow?[8]

Finding an answer to this question is the moral behind this study. Notwithstanding, many scholars have ignored this part of the debate on the scientific knowledge of sustainable development. A gap in research that this thesis aims to address. For example, the book by Eric Neumayer (2013) is one of the first books that shed light on the intense debate between weak and strong sustainability and their indicators. Nonetheless, his work does not touch on the factors that influence the type of sustainability that countries follow. The same applies to that of the work by Egelston (2012).

Barua & Khataniar' s (2015) work is one of the few studies that analyzed the economic growth patterns of countries to understand which type of sustainability they are following. They studied

[8] The word 'follow' is used in this thesis to refer to the development pattern of a country in relation to the type of sustainability it is related to. For example., if a country's development pattern is related to that of weak sustainability, we will say that country is following WS and vice versa. However, whether this 'follow' is of their own choice or influenced by other factors, is outside the scope of this study.

the economic growth patterns of 10 emerging Asian economies (a combination of middle and high-income countries) over 20 years. The authors used Genuine Savings as an indicator of WS and Ecological Footprint for SS. In short, their study found out that the selected middle-income countries are following a path of weak sustainability and the developments in the high-income countries are gradually moving from a path of WS to SS. Bisson (2017), also conducted a somewhat similar study but in a different setting. She adopted a capital approach, again using the Genuine Savings over a period of 35 years, to assess the sustainability path of 30 sub-Saharan African (SSA) countries, based on how they managed their aggregate stock of capital through the difference between consumption in natural resources or capital and counter-balancing investments in other forms of human capital. As mentioned earlier, the main proposition of GS is that a country experiencing a positive number, is deemed to be weakly sustainable (Barua & Khataniar, 2015; Neumayer, 2013; Bissoon, 2017). However, the estimates of her study showed the opposite. Hence, she accentuated that this is an indication of a country following an 'unsustainable' path, as they are not reinvesting the revenues from the depletion of their natural capital in other forms of capital. In sum, her study found that even after two decades, SSA countries under her study are still not on a weak sustainable development path.

These two studies are one of the very few that have researched the economic condition of a country in relation to the type of sustainability their development is related to. Notwithstanding, the study by Barua and Khataniar was only focused on the type of sustainability of the economic developments of the selected countries, and not necessarily the factors that influenced this. Bisson's (2017) work on the other hand, in addition to assessing the sustainability of the economic developments in the selected countries, also looked at the conditioning factors that can affect their GS rates. These factors include trade openness; FDI stock; institutions; income inequality; exports of natural resources; and wars. The results in her stud indicated "that natural resource exploitation, the level of income inequality, wars, over-dependence on exports of natural resources (e.g. oil), and poor institutional quality has a significant negative impact on the GS growth rate of SSA countries" (Bisson, 2017, p.460).

The missing elements in these factors are the economic condition and population growth of the country. While Barua & Khataniar (2015) were only interested in finding out the type of SD that the selected different economic level Asian countries were following, Bisson studied some factors that influence GS growth in SSA countries. We argue that there is a need to look into the extent to which economic conditions influence the type of SD a country follows because finding an answer to this question will open doors to many questions for further research.

Furthermore, the study by Barua & Khataniar focused on *emerging economies* (ie., developing countries rather than undeveloped and/or least developed countries). Bisson's (2017) work was more comparative as she analyzed both the least developed and developing countries in SSA.

Another missing element in the literature is that of 'developed countries'. Most of the studies focused on poor countries of the South, ignoring the rich economies of the West and/or North. This is an immense literature gap as studying the economic development of both categories is equally significant. One possible explanation for this might be the fact that scholars assume rich countries have already achieved development, therefore SD is meant for poor countries. Besides, since they are already developed, it will be logical to assume that they are following a strong sustainable development to preserve and/or protect nature and the environment. However, there is no empirical evidence of such and this is the prima facie that this thesis seeks to clarify. This paper argues that a country might be economically developed and yet still follows weak sustainability. Similarly, a country might be economically poor and follows strong sustainability and vice versa. The only way to support this is to conduct a comparative study of both the least developed and developed countries.

Another factor that is believed to affect the sustainability of countries is population growth. It is argued by scholars that an increase in population will lead to an increase in the consumption and production of natural resources, which eventually puts pressure on the need for both natural and human capital, subsequently leading to the depletion of the environment (Barua & Khataniar, 2015). Thus, population growth will be taken as an additional variable in this study.

2.2. CLASSIFICATION OF COUNTRIES

As stressed earlier, this thesis is about the SD of 'countries' in relation to their economic condition and population growth. Nonetheless, since the economic conditions of countries differ to a large extent, there is a need to look into different categories of countries. Therefore, this section presents the current body of knowledge on the classification of countries based on their economic levels. In addition to conceptualizing the variables, this will help us in finding out if the economic disparity of countries matters for the type of sustainable development they follow, and also help in answering our questions raised about this.

2.2.1. What Determines the Economic Condition of a Country?

The economic condition of a country is determined by the level of economic development in the country, which led the United Nations (UN) and the World Bank (WB), to classify countries into various groups based on their income levels (World Bank, 2019; UN, 2019). The World Bank (2019) classified countries into four income groups: high, upper-middle, lower-middle, and low. They are classified based on income level determined by their Gross National Income (GNI) Per Capita with specific thresholds for inclusion and graduation from each group (World Bank, 2019). The UN (2019) on the other hand classifies countries into three broad categories: developed economies; economies in transition; and developing economies. However, in 1971, the organization came up with a new category of countries called 'least developed countries'.

Since this study is about finding out to what extent the economic condition of countries will influence the type of sustainable development they follow, we will, therefore, look at countries that have a huge disparity in their economic conditions to see if this variation will lead to a certain type of sustainability. Undoubtedly, the category of countries with a huge discrepancy in their economic development is that of 'developed' and 'least developed economies.'[9] Having said that, this study will now look into the concepts of these two categories of countries.

[9] For the purpose of this study the term 'least/developed *economy*' and 'least/developed country' have the same meaning.

2.2.2. What are Developed Countries?

Both the World Bank and the UN did not specifically define the term developed countries. Nonetheless, the UN (2019) has provided a list of countries under developed economies, of which only Bulgaria and Romania did not fall on the high-income group of the World Bank threshold. Hence, this thesis has adopted a working definition of the term developed countries, defined as *'countries with high GNI per capita, and a high Human Development Index (HDI).'* The threshold for inclusion for both GNI is $12,500.00 and the threshold for HDI is a score above 0.800. The GNI per capita is included in this definition as we have mentioned above that the economic condition of a country is determined and classified by both the WB and the UN based on their GNI per capita. The reason for adding the HDI indicator will be explained in the coming part.

2.2.3. What are Least Developed Countries?

The most accepted definition of least developed countries (LDCs) was by the United Nations. The UN (Dec. 2019, p.1) defined LDCs as "low-income countries which are highly vulnerable to economic and environmental shocks and have low levels of human assets."[10] The UN Committee for Development Policy (UNCDP), reviews the list of LDCs in every three years and makes recommendations for inclusion and graduation from the list. Currently, there are 47 countries on the list of LDCs (UN, Dec. 2019). They apply three criteria for the identification of and/or inclusion and graduation from the list. In the latest review of 2018, the UNCDP made the following criteria:

i. Low income

This is measured by the Gross National Income (GNI) per capita which provides information on the income status and the overall level of resources available to a country (UN, Dec. 2019). Based on a three-year average estimate of the GNI per capita, under a threshold of $1,025 for inclusion and $1,230 for graduation.

ii. Low human resources

[10] "Least Developed Countries (LDCs)" https://www.un.org/development/desa/dpad/least-developed-country-category.html accessed on 02.02.2020 at 19:19

This is calculated by the Human Assets Index (HAI), which is a measure of the level of human capital. The threshold for inclusion is 60 and the graduation is set at 66.

iii. Economic vulnerability

This is based on the Economic Vulnerability Index (EVI), which is a measure of a country's vulnerability to economic and environmental shocks. The threshold for inclusion is set at 36 and graduation is set at 32.

Nevertheless, for a working definition of this thesis, this study will add one more criteria to the above: the Human Development Index (HDI). Ergo, least developed economies in this study are defined as *'countries with low GNI per capita, a low HAI, a low EVI, and a low Human Development Index (HDI).'* The study will adopt the thresholds by the UN for GNI per capita, HAI, and EVI. The threshold for HDI is a score of less than 0.600.

Reasons for adding HDI

The first principle of the UN Rio Declaration on environment and development states that "human beings are at the center of concerns for sustainable development" (Rio Declaration, 1992, p.1). Furthermore, "people and their capabilities should be the ultimate criteria for assessing the development of a country, not economic growth alone" (UNDP, 2019, p. 1). It measures three dimensions of human development: health; education; and standard of living (Hara et al., 2009; UNDP, 2019). Countries might be at the same level of GNI per capita and still have divergent human development status. Thus, the HDI is added to allow us to measure the quality of life in a particular country. Development should not only mean in terms of infrastructure and income level but also a good quality of life. Coenen (2013) for instance, highlighted that quality of life is used to define the goal of SD or the status of being sustainable. A country with a very low quality of life should unarguably be considered a least developed country and vice versa. The next chapter presents the methodological approach to help us in answering our central questions.

CHAPTER 3: RESEARCH METHODOLOGY

This chapter presents the research design and methodological approach taken, to help us answer the questions raised in this study. First, we will discuss the research; which is divided into sub-questions. Then the variables, units, and settings. This will be followed by the conceptualization of the variables and the relations between them. The next section presents the thesis arguments and hypothesis, followed by operationalization; data collection; measurement; and validity & reliability of the research.

3.1. Research Question

Based on the literature presented above, this study will aim to find an answer to the central question: *to what extent population growth and the economic conditions of a country influence the type of sustainable development the country follows*[11]*?*

Sub-questions

a. *To what extent population growth has an influence on the type of sustainable development selected countries follow?*
b. *To what extent economic conditions influence the type of sustainable development the country follows?*

As noted in the introduction, we are not looking at the relationship between population growth and economic conditions, nor their combined influence on the type of SD countries follow. Rather, we seek to find out their separate influence by taking them independent of each other.

3.2. Variables, Units, and Setting

The unit of analysis in this question is *country* (i.e. developed and the least developed countries). The variables are *the economic conditions*, *population growth (*independents), and *type of sustainable development (*dependent). Due to time constraints and the availability of data, the setting of the study will be a total of 20 countries; 10 developed countries (from Europe and the

[11] See the footnote on page 7 for the meaning of 'follow' in this question

Americas) and 10 least developed countries (from Asia, Americas, and sub-Saharan Africa), over the period 1998 -2016.

3.3. The conceptualization of the Variables

Population: This is defined in this study as all the inhabitants of a particular country, whereas *population growth* is the increase or decrease in the number of individuals in a country.

Type of sustainable development: there are two types of sustainable development: weak and strong sustainability.

Weak Sustainability

This study defines weak sustainability based on the neoclassical economist perspective presented in the literature review as, *the consumption of natural resources and ecosystem services in view of investing the earned income into other basic human needs.*

Strong Sustainability

Based on the literature review, this thesis defined strong sustainability as *the non-substitutability of natural and human capital, where countries live within their ecological budget (biocapacity).*

Economic Conditions of a country: the two dimensions of the 'economic conditions' in this study are developed and least developed economies.

Least Developed Economies (LDCs)

LDCs are defined in this study as *'countries with low GNI per capita, a low HAI, a low EVI, and a low Human Development Index (HDI).'* The study will adopt the thresholds by the UN for GNI per capita, HAI, and EVI. The threshold for HDI is a score of less than 0.600.[12] A country has to meet the threshold for all the four criteria.

[12] More details of this and the explanation for adopting these definitions have been explained under literature review

Developed Economies:

The term developed countries in this study refer to *'countries with a high GNI per capita, and a high Human Development Index (HDI).'* The threshold for inclusion for GNI is $12,500.00 and the threshold for HDI is a score above 0.800

3.4. Relations Between the Variables

There are two main types of Sustainable development as mentioned above and in the literature. Whereas WS calls for utilizing the environment in view of counterbalancing investments in basic human needs, SS advocates for non-substitutability of natural and human capital, calling for humans to live within their biocapacity.

Since SD is seen and defined in terms of economic development, thus it needs no elaboration for one to assume that the economic condition of a country will have an influence on her type of sustainable development. To boot, we can assume that an increase/decrease in the economic condition of a country will result in an increase/decrease in their demand for and consumption of natural resources and ecosystem services. Taking implicitly, a country having a higher consumption of its natural resources is tacitly following weak sustainability and vice versa. In other words, low economic conditions will make countries consume more natural capital (ie., follow WS), whereas high economic conditions will result in less consumption (ie., follow SS).

Another factor that might presumably affect sustainability is population growth. The human population is projected to increase by 2 billion persons in the next 30 years (UN Report, 2020). It is therefore argued that an increase in the population of a country will lead to an increase in the demand for and consumption of natural resources and ecosystem services, subsequently leading to the depletion of the environment (Barua & Khataniar, 2015). That is to say, higher population growth will lead to weak sustainability. Ergo, this thesis seeks to also analyze the influence of population growth on a county's type of sustainable development.

3.5. Case Selection

Not all units in our research question can be studied, hence we need to select our cases. In view of having a wider external validity, we have selected the following countries from all regions of the world. These countries are selected based on our definition and from the UN (2019) list of Developed and Least Developed Countries. There are a total of 47 LDCs, from which over 70% are located in sub-Saharan Africa, over 19% in Eurasia, only 4 countries in Oceania, and just one country (Haiti) from the Americas. As such in the case of the LDCs, 6 countries are selected from Africa, 3 countries from Eurasia, and 1 from the Americas. There are 36 countries under the list of developed countries, out of which 31 are located in Europe. Only two from the Americas (North); only Japan is included from Asia and the remaining 2 are located in the Pacific. Accordingly, we have selected 6 countries from Europe; 2 from the Americas; 1 from Asia, and 1 from the Pacific. Therefore, the following 20 countries have been selected for this study:

Developed Countries	Least Developed Countries
1. Australia	11. Bangladesh
2. Canada	12. Benin
3. Denmark	13. Burundi
4. Germany	14. Cambodia
5. Japan	15. Haiti
6. Netherlands	16. Malawi
7. Poland	17. Nepal
8. Sweden	18. Niger
9. United Kingdom	19. Tanzania
10. United States	20. Uganda

The criteria for selecting the countries were based on three main factors: data availability; economic indicators; and geographic location. We could not find data on most of the units in our study. Since one of the main aims of this study is to find out what extent the economic condition of a country influences the type of SD it follows, we deem it necessary to consider the economic

disparity of countries and observe if there will be a difference. Thus, we decided to select cases that are most different in their economic conditions and hence why we looked into developed countries and LDCs. For that of the geographical criteria, since our design is cases that are most 'different', to see if this discrepancy will lead to different results, we gave a decent geographical spread on the continents. That is, to see if countries from the same geographical area will all follow a similar/differing type of SD or not, despite them being in the same economic category. In addition, this notion of adopting a geographical spread is done in view of 'generalizing' the results of this study to all the units in our central question.

For that of developed countries, they are 36, out of which 31 are from Europe. Thus, keeping in mind of our geographical criteria, we selected the only country from Asia; the only 2 countries listed from the Americas; among the 2 countries in the Pacific, we selected Australia as there was no data available in the GS of New Zealand for parts of the study period. As for Europe, in addition to the geographical location (West, Central, etc), we selected countries with higher economic conditions (UK, Germany, Netherlands), we selected Scandinavian countries (Sweden, Denmark) as they are the pioneers of SD; and Poland was selected as it has the lowest GNI per capita and HDI among the developed European countries. For that of LDCs, in addition to geographical spread, they were selected mainly based on the availability of data.

3.6. Data Collection

This thesis will use secondary data, which will be taken from the World Bank's World Development Indicators (for GNI per capita & Genuine Savings), the Human Development Reports of the United Nations Development Program (for HDI), and the Global Footprint Network database (for ecological footprint & biocapacity). The reason for selecting genuine savings and ecological footprints as opposed to others is because they are the only indicators that we have data for our units.

3.7. Hypotheses & Thesis Argument

This thesis argues that the economic condition of a country will influence the type of sustainability they follow. In other words, low economic conditions will make countries consume more natural capital (implicitly follow WS), whereas high economic conditions will result in less consumption (implicitly follow SS).

As for population, this thesis argues that growth in population will only influence the type of sustainability in the least developed countries, in the sense that it will not lead to an increase in the ecological footprint of developed countries. Since the basic assumption is that an increase in population will result in an increase in the consumption of resources. Wealthy countries (unlike poor countries) have the capability to invest in the consumption of renewable resources due to the advancement of technology in their country. Poor countries, on the other hand, do not have the luxury to afford such sophisticated technology.

Another missing element in the literature is that of developed countries. Most of the studies focused on poor countries of the South, ignoring the rich economies of the West and/or North. One possible explanation for this might be the fact that scholars assume rich countries have already achieved development, therefore SD is meant for poor countries. Besides, since they are already developed, it will be logical to assume that they are following a strong sustainable development to preserve and/or protect nature and the environment. However, there is no empirical evidence of such and this is the prima facie that this thesis seeks to clarify. This thesis argues that a country might be economically developed and yet still follows weak sustainability. Similarly, a country might be economically poor and follows strong sustainability and vice versa.

Thus, this study made and will explore the following arguments:

- ★ the economic condition of a country will influence the type of sustainability it follows
- ★ a country might be economically developed and yet still follow weak sustainability. Similarly, a country might be economically poor and follow strong sustainability

★ growth in population will only influence the type of sustainability in the least developed countries. That is, it will not result in an increase in the demand for and consumption of natural capital in developed countries and vice versa.

In order to support these arguments, we will verify the following hypotheses:

1. GNI per capita will influence the ecological footprint of a country
2. HDI will influence the ecological footprint of a country
3. Population increase will influence the ecological footprint in LDCs
4. Population increase will not influence the ecological footprint in developed countries.

3.8. Operationalization

To answer the above research question, this study will adopt a comparative case study design. This is adopted for the answers of the selected countries in this study to be applied to all units in the research question. By this, the study does not seek to draw conclusions about a specific country but rather, aims at inductively developing a theory that complements our knowledge of the nexus between the economic condition of a state and the type of sustainability they follow. To do so, this study will use a Time Series data set of 20 countries for a period of 18 years, between 1998 to 2016.

To understand the interplay of the variables, first, we will look at/analyze the economic condition in the countries separately and then the trendlines of their sustainability indicators, to see the type of sustainability they are following. Finally, we will perform a correctional analysis between the independents and dependent variables. We will observe if an increase or decrease in their economic conditions will correspond to an increase or decrease in their sustainability indicators. The same will be done for that of population growth with SD indicators. The indicators for the economic condition will be the GNI per capita and the HDI of the countries. The indicators for that of weak and strong sustainability will be Genuine Savings and Ecological Footprints respectively. The output data will then be represented in a graph for easy illustration.

After identifying the type of sustainability that a country is following, we will then verify the hypotheses made in this thesis by using Pearson Correlation Analysis. The decision rule for accepting or rejecting the hypothesis will be based on the significance of the correlation between the variables at level 0.05 (alpha). If P is less than alpha, there is a significant relationship and hence the hypothesis will be accepted and vice versa

3.8.1. Measurement of the variables

To measure the economic conditions of the countries, we will look at the figures of GNI per capita and HDI. Likewise, to measure WS we will look at the scores of GS if they are negative or positive. A positive GS indicates WS, whereas a negative score indicates weak unsustainability. For measuring SS, we will look at the scores of EF (the demand for and consumption of natural capital) against the Biocapacity (the budget, availability, and/or supply of this capital) of a country. If the EF of a country is less than its Biocapacity (BC), then the country has an *ecological reserve* and hence strongly sustainable. Likewise, if EF is more than BC, the country has an ecological deficit or debt, which represents unsustainability.

Barua and Khataniar (2015, p.13), made three hypotheses in their study on the relationship of WS and SS based on EF and GS. First, they argued that "a country is on a path of strong sustainability if its ecological footprint does not overshoot its biological capacity…." Second, if the EF of a country is more than its BC, but its GS has a positive trend then the country is regarded as weakly sustainable. Finally, the opposite of the second point will be regarded as not sustainable at all (Barua & Khataniar, 2015). This paper agrees with the last two points, however, disagrees with their first argument as it ignores and/or didn't address the question of a country having an ecological reserve (when EF is less than BC) and yet still has a negative GS score. Should they be still considered strongly sustainable? The answer to this question is in the negative. Firstly, WS told us that a country having a negative GS (not investing the income generated from the consumption of natural capital into human capital), is weakly unsustainable since GS is an extension of the Hartwick rule "where it is assumed that an economy will be sustainable if savings are superior to the aggregated depreciation of human, man-made and

natural capital" (Barua & Khataniar, 2015, p.13). Thus we can say that weak sustainability is a prerequisite for achieving strong sustainability as a country cannot be unsustainable and strongly sustainable at the same time.

Ergo, the general propositions that this study will adopt as a guideline for the measurement of WS and SS indicators are as follows:

- (a) if a country's ecological footprint does not exceed its biocapacity, and its GS has a positive trend, then the country is following strong sustainability;
- (b) if a country's EF does not exceed its biocapacity, however, its GS has a negative trend, then the country is on a path of unsustainability.
- (c) if a country's EF is more than its biocapacity, but it's GS has a positive trend, then the country is following weak sustainability;
- (d) if a country's EF is more than its biocapacity and its GS has a negative trend, then the country is on a path of unsustainability.

3.9. Validity and Reliability

Considering this study will be the first that combines comparatively both Least and Developed countries, and the fact that cases are selected from all regions of the world, the results of this study will have a wide range of external validity. Again, since the measurements of our variables have included all aspects of our concepts in relation to the research question, this study will also have content, measurement, and sampling validity. Furthermore, the data that has been used in this study is already computed and open to anyone to access. Thus, a replica of this study over time will yield the same results.

Out of the many indicators of WS, GS is selected for the following reasons: (i) it is widely recommended by scholars; (ii) it was developed by the World Bank; (iii) its data is available for almost all countries. In addition, GS is calculated in the level of countries since the unit of analysis in this study is countries, it suits best for our research question. EF is also selected for similar reasons. However, unlike the world bank, it is computed by the Global Footprint Network; the organization that developed the tool. Thus, the data collected in this study are from highly valid organizations.

3.10. Limitations

Nonetheless, the lack of data available on all the units of our study has influenced our case selection as we have chosen countries which we do have data on. Similarly, this has also influenced our study period. Most of the LDCs do not have data from 1998 downwards and 2016 is the latest available data for the ecological footprint of all the countries. This led us to narrow our study period to only 18 years. Furthermore, most of the LDCs have incomplete and no recent data for Genuine savings. In specific, we found a complete dataset on only 16 countries from the list of LDCs. considering the need to select the same number of countries from each category, this means we would have had a total of 32 countries in our study. However, due to the time available to conduct this research, it was not possible to study all the 32 countries. This explains why we limit our case selection to only 10 countries for each category. Moreover, we admit that the study may be biased by the way in which some countries (Europeans) are selected.

With the methodological approach being presented, we will now look at the findings of the study to help us answer the research.

CHAPTER 4: DATA ANALYSIS & FINDINGS

THE ECONOMIC CONDITION & SUSTAINABILITY INDICATORS OF THE COUNTRIES

This chapter presents the findings of the overall study. We first looked at the economic and sustainability indicators of the countries separately, illustrated in a Time Series graph to understand their growth trajectories. Then we presented the correlation between our three variables model on a table. This is done in order to answer our central and sub-questions. In view of avoiding dubiety between the two categories, we first start with developed countries and then followed by LDCs. The countries are present in alphabetical order. At the end of the section for each category, we summarised the findings in a table for easy illustration. By the end of this chapter, we expect to find a certain level of association between our three variables model.

4.1. DEVELOPED COUNTRIES

AUSTRALIA

Economic indicators (figure 1a)

The GNI per person in Australia has an increasing trend from 1998 to 2016, from $21,740 to $54,140. The country's highest value was in 2013 where it almost doubled the amount of 1998 before starting to slightly drop. The HDI pretty much remained the same indicating that people in the country have almost the same quality of life even after 18 years.

Sustainability indicators (figure 1b)

Australia has a huge ecological reserve as its biocapacity overshadows its EF throughout the duration of the study. However, the available productive land in the country has a decreasing trend as its biocapacity in 1998 was 17.92 and 12.27 in 2016 (i.e., almost a 32% decrease). On the positive side, the EF is also decreasing, though at a slower pace compared to that of BC. The country's GS is unstable and declined significantly in 2007 to almost half of its initial amount.

However, they recovered and peaked in 2012 at 9.4, but only to decline once again. In general, Australia has a 45% decrease in her GS from 1998 to 2016.

Correlation of the variables

In figure 1b, we can see that overall from 1998 to 2016, Australia's biocapacity is more than its EF and has a positive GS. Thus, the country's development is related to strong sustainability.

Figure 1a. Trends of GNI and HDI in Australia

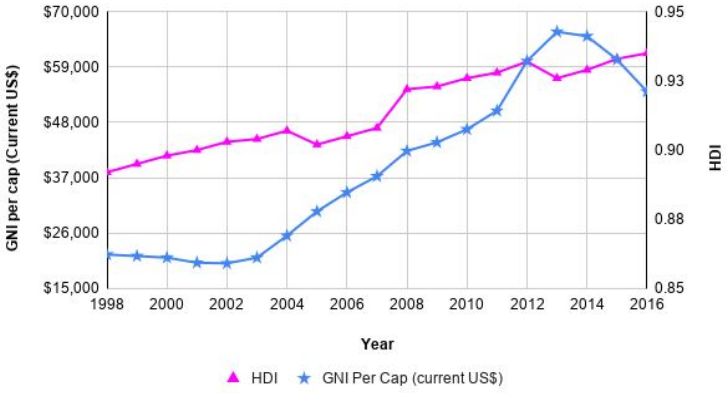
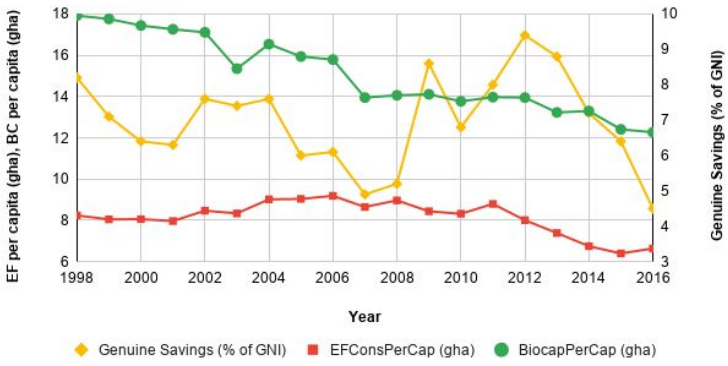


Figure 1b. Trends of Genuine Savings, Ecological Footprint & Biocapacity in Australia



There is a negative correlation between both HDI and GNI per person with EF (Table 1). Although the R^2 for both of them is low (figure 1b & 1d), the correlation, however, is significant at a 0.05 level (table 1). Thus, as the country's economy was developing, its sustainability measures were declining simultaneously which is only good for EF and not for biocapacity and GS.

Figure 1c. Trends of the Correlation of GNI Per Capita vs Genuine Savings & Ecological Footprint in Australia

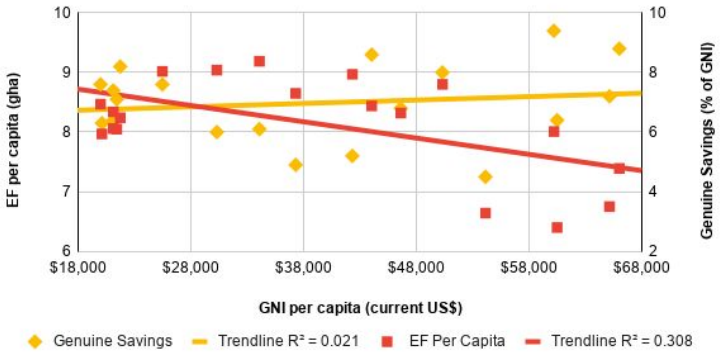
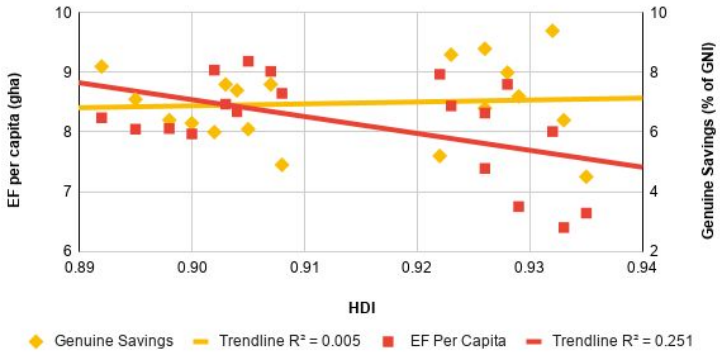


Figure 1d. Trends of the Correlation of HDI vs Genuine Savings & Ecological Footprint in Australia



The same applies to that of the population growth in the country (figure 1e), which has an increment of 5.48 million people from 1998 to 2016. Moreover, the correlation between it and EF is slightly stronger than that of the economic indicators and significant at a 0.01 level (table 1). In sum, there is less or no correlation between GNI per capita income, HDI, and Population growth with GS in Australia.

Figure 1e. Trends of the Correlation of Population vs Genuine Savings & Ecological Footprint in Australia

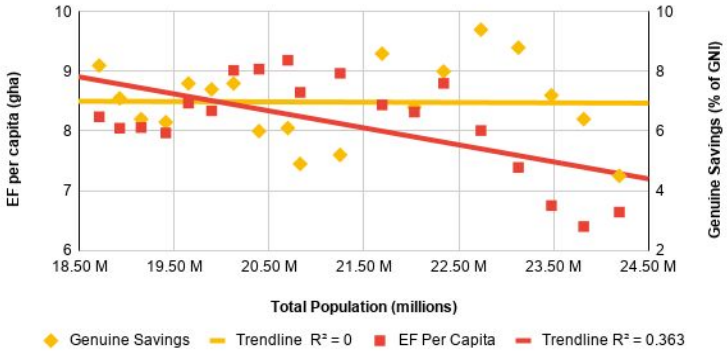


Table 1. CORRELATION OF THE VARIABLES IN AUSTRALIA

	ECOLOGICAL FOOTPRINT	GENUINE SAVINGS
GNI PER CAPITA		
Pearson Correlation (r)	-0.555*	0.143
Sig. P (2-tailed)	0.014	0.558
N	19	19
HDI		
Pearson Correlation (r)	-0.501*	0.070
Sig. (2-tailed)	0.029	0.774
N	19	19
POPULATION		
Pearson Correlation (r)	-0.602**	-0.014
Sig. (2-tailed)	0.006	0.956
N	19	19

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

CANADA

Economic indicators (figure 2a)

Just like Australia, Canada's GNI per capita has increased throughout, doubling the amount in 1998. In total, the average income of every Canadian in 2016 was $23,000 more than their countrymen in 1998. However, an interesting observation is that both Australia and Canada's GNI per capita were higher from 2012 to 2014, peaked in 2013 and suddenly declined afterward. The quality of life in the country also remains high and increases gradually.

Sustainability indicators (figure 2b)

GS in Canada has an unstable growth. The highest increments were in 2004 - 2008 but significantly dropped in 2009. However, it slightly recovered until 2014 with over 100% increment but could not maintain the path and like Australia, subsequently declined afterward. In 1998, the EF and biocapacity per capita in Canada were 8.49 gha and 17.87 respectively, which

decreased by just 8.83% for EF and almost 16% for that of biocapacity in 2016. Nevertheless, the country still has an ecological reserve.

Correlation of the variables

Just like Australia, with positive GS, and an ecological reserve, the development in Canada is also strongly sustainable during these periods. However, its biocapacity is declining at a higher rate than its ecological footprint.

Figure 2a. Trends of GNI and HDI in Canada

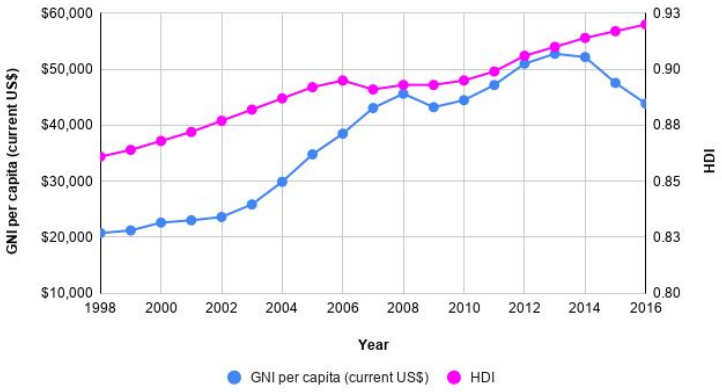
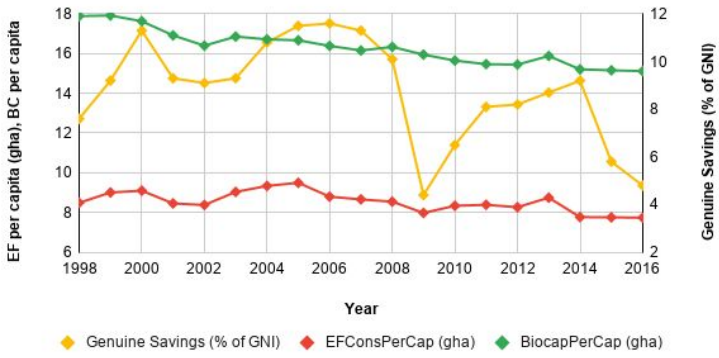


Figure 2b. Trends of Genuine Savings, Ecological Footprint & Biocapacity in Canada



The economic condition and quality of life in the country on the other hand is increasing and have a negative correlation with the EF of the country, as can be seen from the GNI per capita trendline (figure 1c, 1d and table 2). Ergo, just as in Australia, an increase in the economic development of Canada is suiting to a decrease in the demand and/or consumption of natural resources but also a decrease in the supply of the area needed for these resources.

The correlation between population growth and EF is significant at a 0.01 level (table 2). Hence, similar to Australia, the correlation between population and EF in Canada is stronger and more significant than that of GNI and HDI. In both the two countries, as their population and economic condition grow, their demand and/or consumption of carbon emissions, food, fiber, timber, use of land, (ecological footprint), etc. decreases while their planet's budget also reduces.

Figure 2c. Trends of the Correlation of GNI Per Capita vs Genuine Savings & Ecological Footprint in Canada

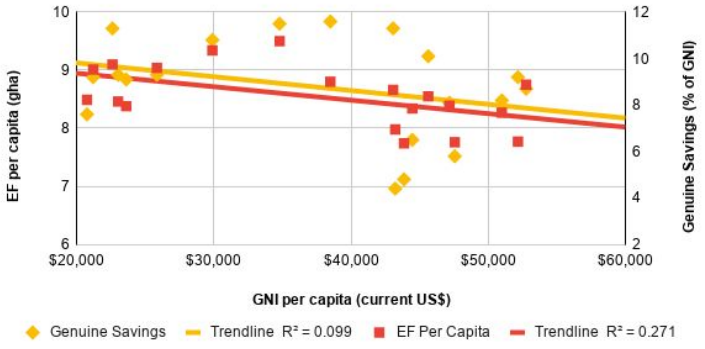


Figure 2d. Trends of the Correlation of HDI vs Genuine Savings & Ecological Footprint in Canada

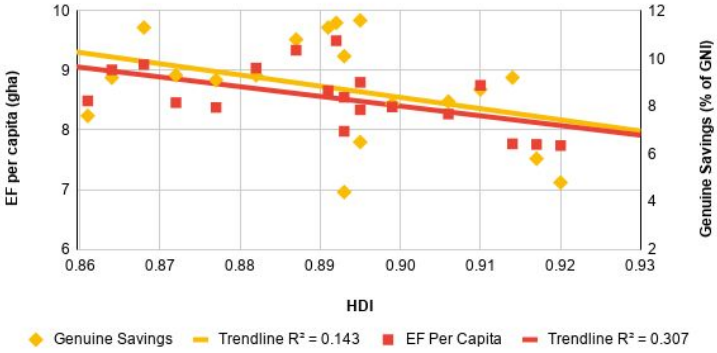


Figure 2e. Trends of the Correlation of Population vs Genuine Savings & Ecological Footprint in Canada

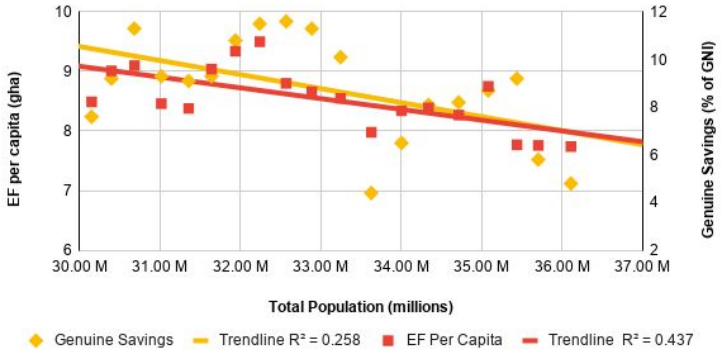


Table 2. CORRELATION OF THE VARIABLES IN CANADA

	ECOLOGICAL FOOTPRINT	GENUINE SAVINGS
GNI PER CAPITA		
Pearson Correlation (r)	-0.520*	-0.315
Sig. P (2-tailed)	0.022	0.190
N	19	19
HDI		
Pearson Correlation (r)	-0.554*	-0.378
Sig. (2-tailed)	0.014	0.111
N	19	19
POPULATION		
Pearson Correlation (r)	-0.661**	-0.508*
Sig. (2-tailed)	0.002	0.026
N	19	19

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

DENMARK

Economic indicators (figure 3a)

Although Denmark might be a smaller country compared to Australia and Canada, its economic development is at a similar level with both the two countries. Actually, in 1998, every Dane had over $12,000 more than the average Australian and Canadian. Interestingly, Denmark's GNI per capita was highest in 2012 - 2014, but just like the above two countries, it suddenly declined afterward. With almost a 10% increase in their HDI, Danis people also enjoy a similar quality of life like every Australian and Canadian.

Sustainability indicators (figure 3b)

Danes are demanding more natural resources and ecological services than the country's available budget for this capital. Nevertheless, their EF is gradually decreasing from 8.66 in 1998 to 6.8 in 2016. Pleasingly, its biocapacity only had a 13.6% reduction in 18 years, which is more than half of the total reduction in Australia's biocapacity. In 2016, every person in Denmark demanded 0.66 (gha) less of natural capital than those in 1998. The country's GS was slowly increasing and decreasing until it remarkably dropped in 2009 (the same year that Canada's GS also notably declined) from 14.4 (1998) to 10.9 (2009). However, they were able to recover soon after with an almost 22% increase in 2016.

Figure 3a. Trends of GNI Per Capita and HDI in Denmark

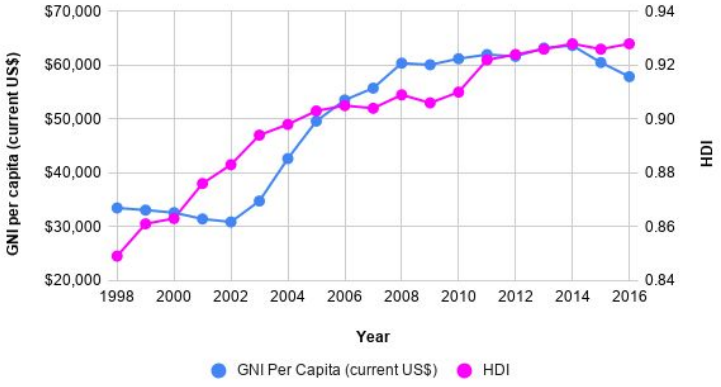
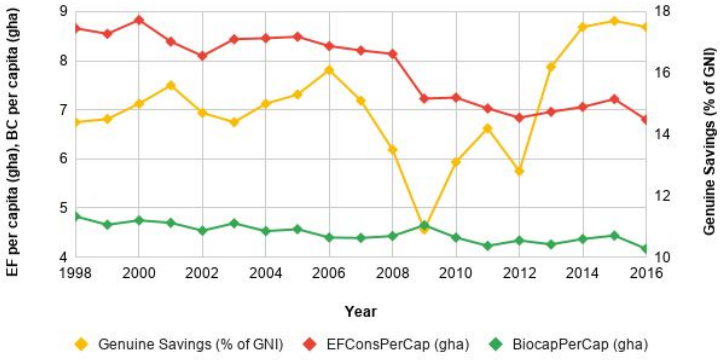


Figure 3b. Trends of Genuine Savings, Ecological Footprint & Biocapacity in Denmark



Correlation of the variables

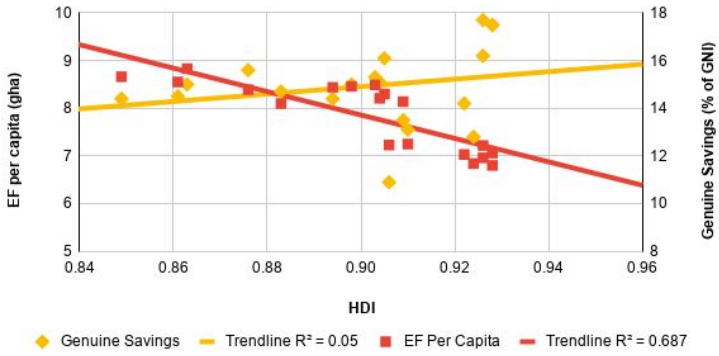
Although Denmark might have similar economic conditions like that of Australia and Canada, however, Danish people are living above their earth's budget as the EF of the country is more than its biocapacity. With positive GS and an ecological deficit, the country is following weak sustainable development. Nonetheless, with an increasing GS trend and a decreasing EF, Denmark is slowly moving towards strong sustainability.

Conversely, its economic condition was swiftly inclining in the last quarter of the study period. However, unlike the above countries, as its economy and quality of life increases, its GS also increases, though there is a little correlation between them with an R^2 of less than 0.1 for both

GNI per capita and HDI (figure 3c & 3d). On a similar side with the above countries, as the country's economy develops, her demand for and consumption of natural capital reduces (figure 3c) with a strong correlation of -0.81 for GNI per capita and EF (Table 3).

Figure 3c. Trends of the Correlation of GNI Per Capita vs Genuine Savings & Ecological Footprint in Denmark

Figure 3d. Trends of the Correlation of HDI vs Genuine Savings & Ecological Footprint in Denmark



The population, on the other hand, remains more or less steady with a total increase of only about 8% over the study period. Despite this less increase, Denmark has an extortionate R^2 of 0.85 (figure 3e) negative correlation between its population and EF. Likewise, just as in the above countries, there is less or no correlation between GNI per capita, HDI, and population growth with GS in Denmark (table 3).

Figure 3e. Trends of the Correlation of Population vs Genuine Savings & Ecological Footprint in Denmark

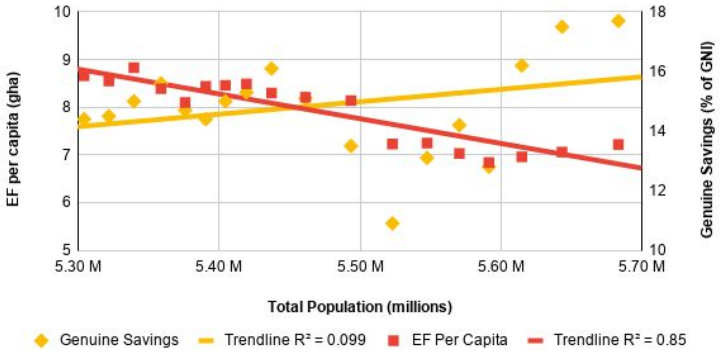


Table 3. CORRELATION OF THE VARIABLES IN DENMARK

	ECOLOGICAL FOOTPRINT	GENUINE SAVINGS
GNI PER CAPITA		
Pearson Correlation (r)	-0.806**	0.027
Sig. P (2-tailed)	0.000	0.911
N	19	19
HDI		
Pearson Correlation (r)	-0.829**	0.224
Sig. (2-tailed)	0.000	0.357
N	19	19
POPULATION		
Pearson Correlation (r)	-0.922**	0.315
Sig. (2-tailed)	0.000	0.189
N	19	19

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

GERMANY

Economic indicators (figure 4a)

Between the periods 1998 to 2002, the average income of every German declined. However, the country clawed back in 2003 and henceforth had a whopping 87.51% increase from 2002 to 2016. The HDI, like all the above countries, remained more or less steady with an overall increment of less than 10%.

Sustainability indicators (figure 4b)

GS in Germany has an increasing trend like its European counterpart. An interesting observation is that GS in Canada, Denmark, and Germany remarkably declined in 2009. However, it bounced back and since then has increased from 9.3 (2009) to 14.2 (2016). The country's EF on the other side exceeds its biocapacity, though with a decreasing trend like that of Denmark. Each individual in Germany in 2016 was demanding 0.91 (gha) natural resources and ecosystem services less than those in 1998.

Figure 4a. Trends of GNI per capita and HDI in Germany

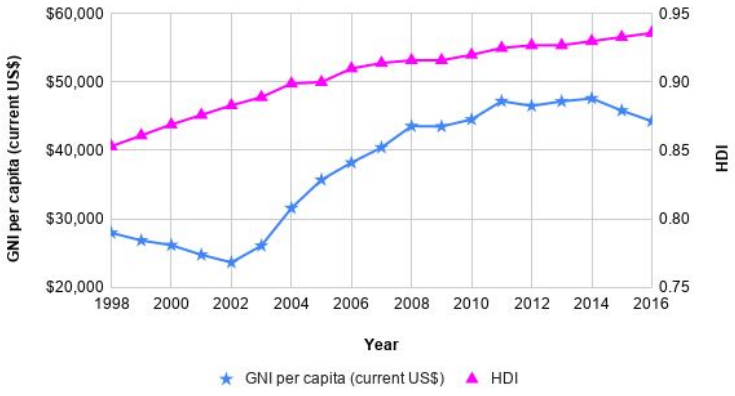
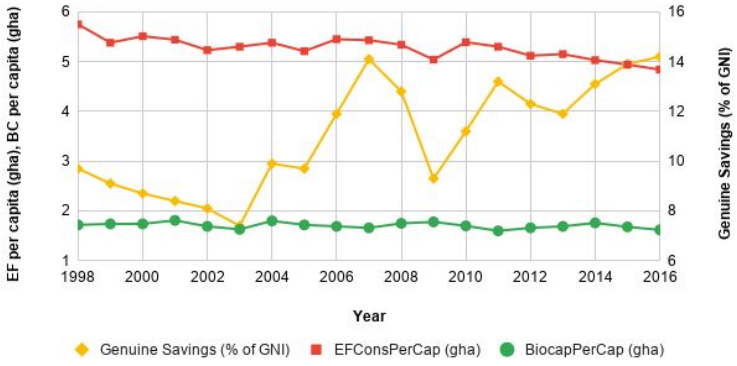


Figure 4b. Trends of Genuine Savings, Ecological Footprint & Biocapacity in Germany



Correlation of the variables

Although her EF is decreasing, Germany is having a higher ecological deficit than Denmark. Each person in Germany in 2016 was demanding 4.84 (gha) of natural capitals, while the available supply of these capitals was only 1.62 (gha). That is, Germans were consuming 3.22 (gha) of natural capital above their available budget. On the bright side, the country is having a

positive GS trend which makes its development sustainable but weak. Nonetheless, they are slowly moving towards strong sustainable development.

Another similar trend between the two European countries is that both their GS and economic conditions are increasing unlike in Australia and Canada. This leads to a significant positive correlation of 0.838 for GNI per capita vs GS and 0.785 for HDI and GS (Table 4). Likewise, as the economic conditions of people in Germany grow, their demand for and consumption of natural capital also reduces, though at a slower rate. An increase in the gross income per person correlates by 0.58 to the decrease in the EF of the country (figure 4c & table 4).

Figure 4c. Trends of the Correlation of GNI Per Capita vs Genuine Savings & Ecological Footprint in Germany

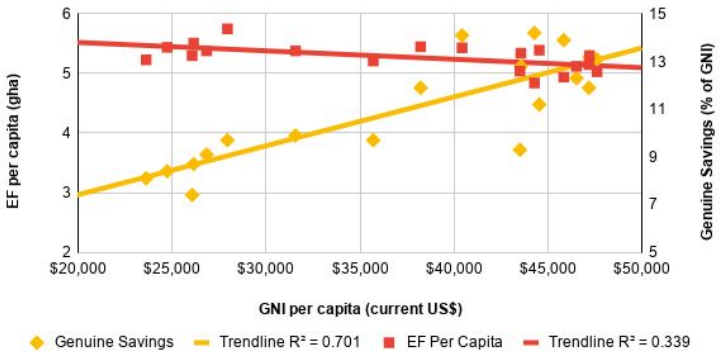
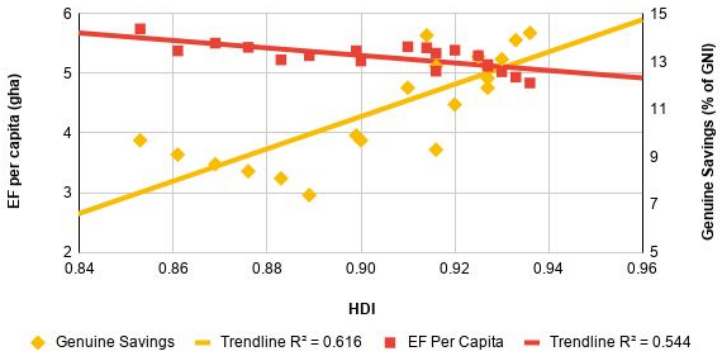


Figure 4d. Trends of the Correlation of HDI vs Genuine Savings & Ecological Footprint in Germany



In parallel to that of Denmark, the population in Germany remains more or less steady with only an increase of 0.37% from 1998 to 2016 (figure 4d). Thus, this explains why only the population has a negative correlation (-0.467) with genuine savings and no significant correlation with ecological footprint in Germany. As the population of Germany is almost stable, their demand and supply of natural resources and ecological services contrastingly, are decreasing (figure 4e). However, the influence of population growth on ecological footprint is not present for Germany.

Figure 4e. Trends of the Correlation of Population vs Genuine Savings & Ecological Footprint in Germany

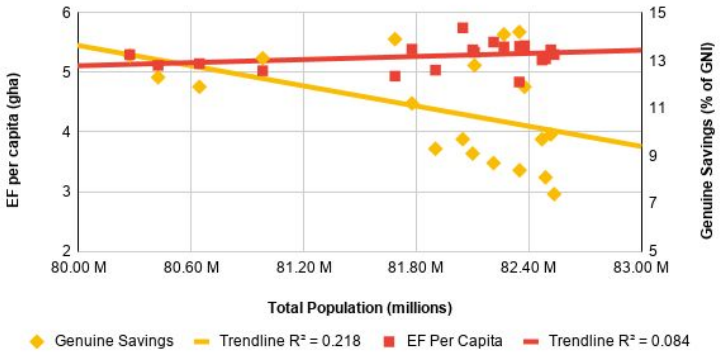


Table 4. CORRELATION OF THE VARIABLES IN GERMANY

	ECOLOGICAL FOOTPRINT	GENUINE SAVINGS
GNI PER CAPITA		
Pearson Correlation (r)	-0.582**	0.838**
Sig. P (2-tailed)	0.009	0.000
N	19	19
HDI		
Pearson Correlation (r)	-0.737**	0.785**
Sig. P (2-tailed)	0.000	0.000
N	19	19
POPULATION		
Pearson Correlation (r)	0.290	-0.467*
Sig. P (2-tailed)	0.228	0.044
N	19	19

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

JAPAN

Economic Indicators (figure 5a)

Japan is Asia's only country that is classified by the UN as a developed country and also a member of the Major Developed Economies namely; G7 (UN, 2019). The reason for her inclusion into G7 is evident in its HDI and GNI per capita income trendline in figure 5a. Although both its economic indicators have an increasing trend, growth in her GNI per capita income on the other hand is inconsistent and decreased abruptly from 2012 onwards. Throughout the study period, it did not recover and instead rapidly declined (figure 5a). The HDI reversely has moderate growth over the study period.

Sustainability Indicators (figure 5b)

Japan joined the Australia-Canada camp for countries with decreasing GS. It also entered the list of countries that had a remarkable decrease in their GS in 2009. However, unlike the other countries, Japan is yet to fully recover to its glorious times of 1998, where her GS was 11.3. Although the country's EF has a decreasing trend, however, it is at a slower rate compared to the above countries. Its biocapacity also decreases at a similar rate to that of EF. The EF had a total decrease of only 12.98%, which is 3.61% more than the decrease in its biocapacity. Nonetheless, the Japanese are still demanding 3.91(gha) more than their country could generate in 2016.

Figure 5a. Trends of GNI per capita and HDI in Japan

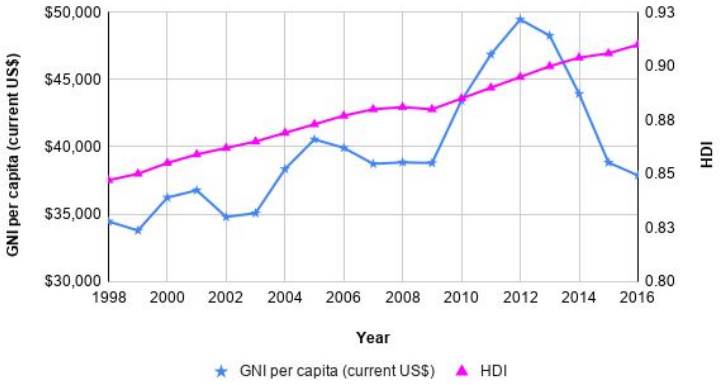
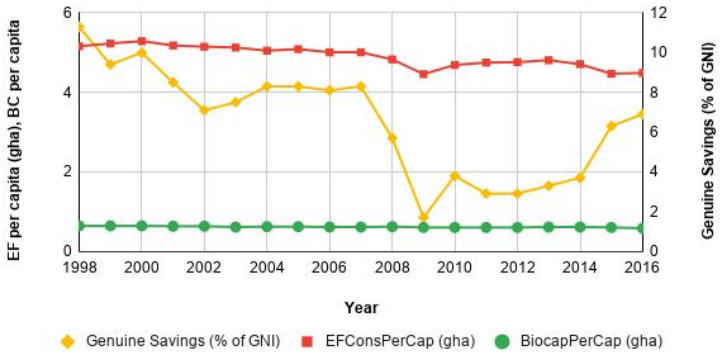


Figure 5b. Trends of Genuine Savings, Ecological Footprint & Biocapacity in Japan



Correlation of the variables

Throughout the study period, the Japanese are demanding and/or consuming more natural capital than their available budget, which makes the country have an ecological deficit. With positive genuine savings and an ecological deficit, the country is following a weak sustainable development, though slowly going towards strong sustainability.

Although the country has a weak correlation R^2 of only 0.248 (figure 5c) between its GNI per capita and ecological footprint, however, the relationship is significant at a 0.05 level (table 5). This depicts the influence of income per capita on the demand for and consumption of natural capital in Japan. Quality of life in the Asian country has an even stronger relationship with EF with R^2 of 0.744 (figure 5d) and a significant value of 0.000 (table 5). Both economic indicators correlate negatively with EF and GS (Table 5).

In addition, there is also a significant negative correlation of 0.55 between population growth with genuine savings but the reverse is true for that of population growth with ecological footprint in Japan (figure 5e & table 5).

Figure 5c. Trends of the Correlation of GNI Per Capita vs Ecological Footprint & Genuine Savings in Japan

Figure 5d. Trends of the Correlation of HDI vs Ecological Footprint & Genuine Savings in Japan

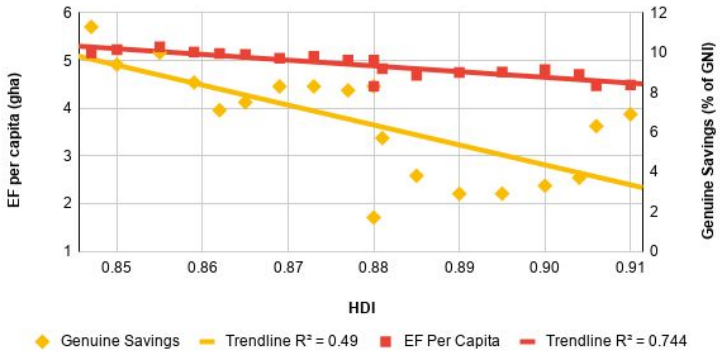


Figure 5e. Trends of the Correlation of Population vs Ecological Footprint & Genuine Savings in Japan

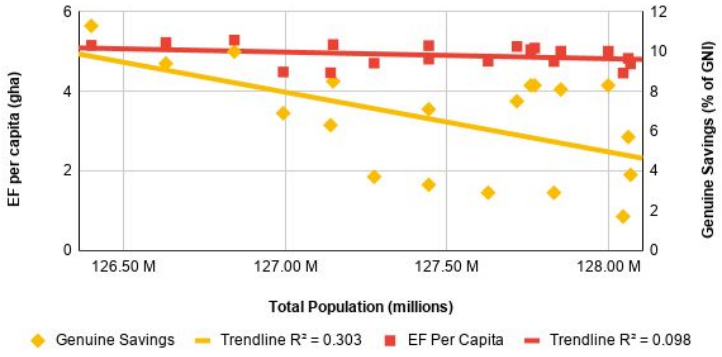


Table 5. CORRELATION OF THE VARIABLES IN JAPAN

	ECOLOGICAL FOOTPRINT	GENUINE SAVINGS
GNI PER CAPITA		
Pearson Correlation (r)	-0.498*	-0.763**
Sig. P (2-tailed)	0.030	0.000
N	19	19
HDI		
Pearson Correlation (r)	-0.863**	-o.700**
Sig. P (2-tailed)	0.000	0.001
N	19	19
POPULATION		
Pearson Correlation (r)	-o.313	-0.551*
Sig. P (2-tailed)	0.192	0.015
N	19	19

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

NETHERLANDS

Economic Indicators (figure 6a)

There is a similar occurrence in the GNI per capita of all the countries so far. Though overall their income per capita is increasing, however, it has a declining trend from 2012 onwards. The Netherlands was not an excuse for this phenomenon. In 2011, the country's GNI per capita income almost doubled the initial amount before it started to evenly decline by almost 14% in 2016. The HDI on the other hand has a steady growth with only a score of 0.06 more than that of 1998.

Sustainability Indicators (figure 6b)

It is fair to say that the average Dutch is demanding and/or consuming a lot of natural resources and ecosystem services more than their country is able to provide as can be seen in their EF trendline. In 1998, Nederlanders were demanding 6.23 (gha) of natural capital while their budget to provide this capital was only 0.90 (gha). Even after 18 years, this demand only had a 22.47% decrease, while their biocapacity almost suffered a 9% loss. The country has an unstable GS growth, which shifted from 15.7 (1998) to 17 (2007) before abruptly declining to 13.6 in 2009. Nonetheless, the country recovered in 2016 though only a score of 0.2 more than the 1998 value.

Figure 6a. Trends of GNI per capita and HDI in Netherlands

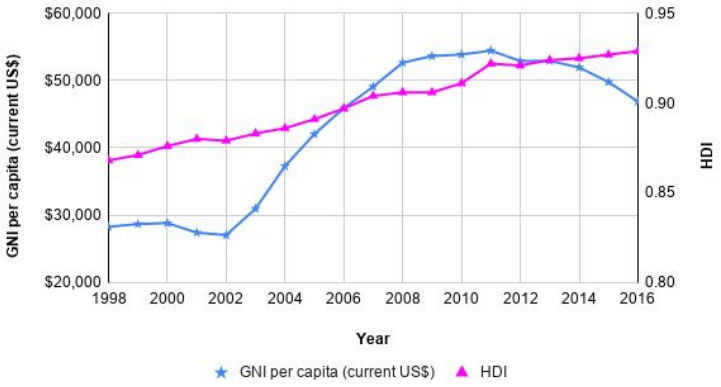
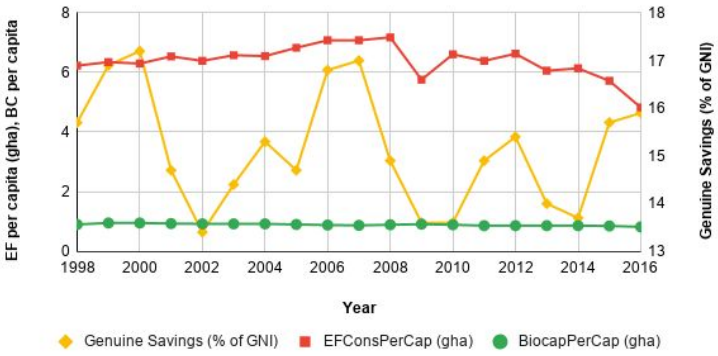


Figure 6b. Trends of Genuine Savings, Ecological Footprint & Biocapacity in Netherlands.



Correlation of the variables

Though the country is having positive GS, Netherland's EF exceeds its biocapacity which makes its development weakly sustainable. However, with a decreasing EF trend, the country is softly moving towards strong sustainability.

Surprisingly, there is no strong and/or significant correlation between both the economic indicators and population with that of the sustainability indicators in the Netherlands (Table 6). Though they all correlate negatively, however with pretty low R^2 values (figure 6c, 6d, & 6e), there is no important relationship between them.

Figure 6c. Trends of the Correlation of GNI Per Capita vs Genuine Savings & Ecological Footprint in Netherlands

Figure 6d. Trends of the Correlation of HDI vs Genuine Savings & Ecological Footprint in Netherlands

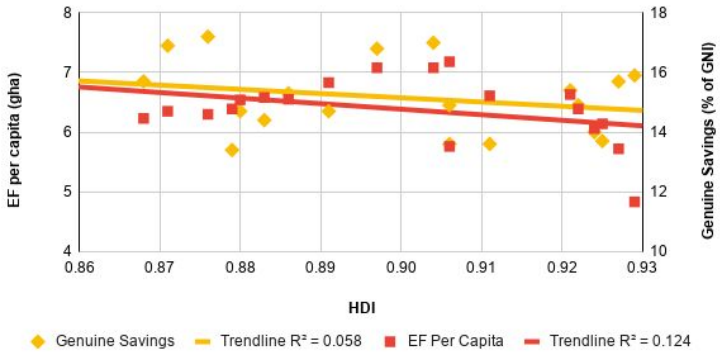


Figure 6e. Trends of the Correlation of Population vs Genuine Savings & Ecological Footprint in Netherlands

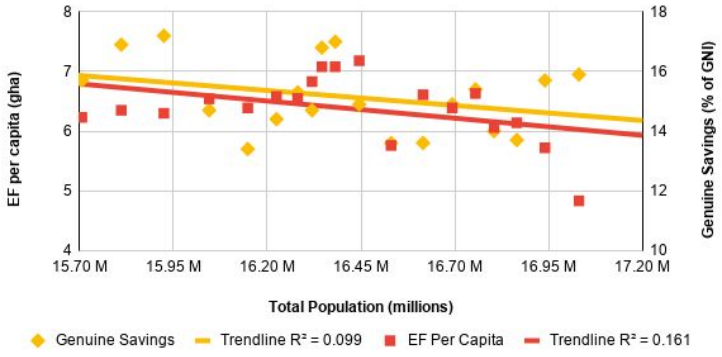


Table 6. CORRELATION OF THE VARIABLES IN NETHERLANDS

	ECOLOGICAL FOOTPRINT	GENUINE SAVINGS
GNI PER CAPITA		
Pearson Correlation (r)	-0.056	-0.235
Sig. P (2-tailed)	0.821	0.333
N	19	19
HDI		
Pearson Correlation (r)	-0.352	-0.240
Sig. P (2-tailed)	0.140	0.322
N	19	19
POPULATION		
Pearson Correlation (r)	-0.401	-0.315
Sig. P (2-tailed)	0.089	0.189
N	19	19

POLAND

Economic Indicators (figure 7a)

The Central European country has the lowest GNI per capita among the selected developed countries. Nonetheless, their income per capita is rapidly increasing; tripling the amount of 1998 by shifting from $4,350 to $12,710 (2016) respectively. Hence, earned her among the list of developed countries. With steady growth and an overall increase of 12.35%, Polish people enjoy almost a similar quality of life with their European counterparts in this study.

Sustainability Indicators (figure 7b)

Although the country is having an ecological deficit, Poles are demanding less from their more or less stable biocapacity in comparison to the above European countries. In 1998, every person in Poland was demanding 2.49 (gha) of natural capital more than their biocapacity; whereas Dutch, Danes, and Germans were demanding 5.33 (gha), 3.83 (gha), and 4.03 (gha) respectively. This demand in Poland remained more or less the same even after 18 years with few ups between 2007 - 2010. During the period 1998 to 2004, Poland's GS declined rapidly from 9.1 (1998) to 3.4 (2004). Nevertheless, they were able to bounce back and rose more than threefold in 2016.

Figure 7a. Trends of GNI per capita and HDI in Poland

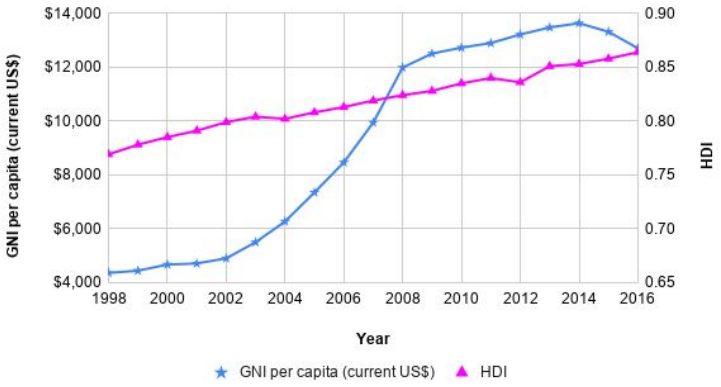
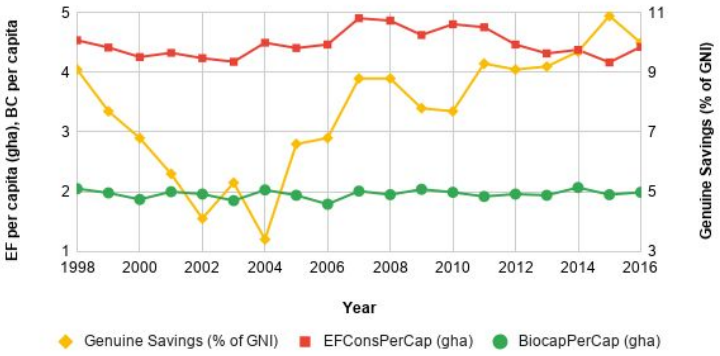


Figure 7b. Trends of Genuine Savings, Ecological Footprint & Biocapcity in Poland



Correlation of the variables

Though they have positive GS, Pole's EF exceeds their biocapacity, making their development weakly sustainable. Even so, with more or less a stable ecological footprint unlike other developed countries, Poland is moving towards strong sustainability at a slower rate than her fellow developed countries.

Unlike the Netherlands, there is a significant correlation between GS and GNI per capita in Poland and the same is true for that of HDI (figure 7c, 7d & table 7). Nonetheless, similar to the Netherlands, there is no important correlation between EF and any of the economic indicators.

Poland is the only country so far, with a steady decrease in its population. Her population decreased by almost 700,000 people in 18 years (figure 7e). Though they have negative

correlations, there is no important relationship between population growth with any of the sustainability indicators in Poland (figure 7e & table 7).

Figure 7c. Trends of the Correlation of GNI Per Capita vs Genuine Savings & Ecological Footprint in Poland

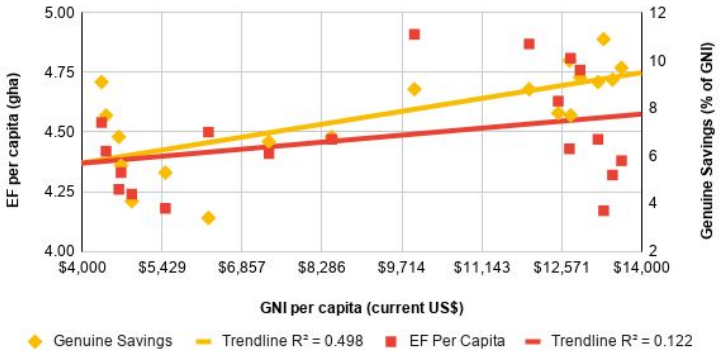


Figure 7d. Trends of the Correlation of HDI vs Genuine Savings & Ecological Footprint in Poland

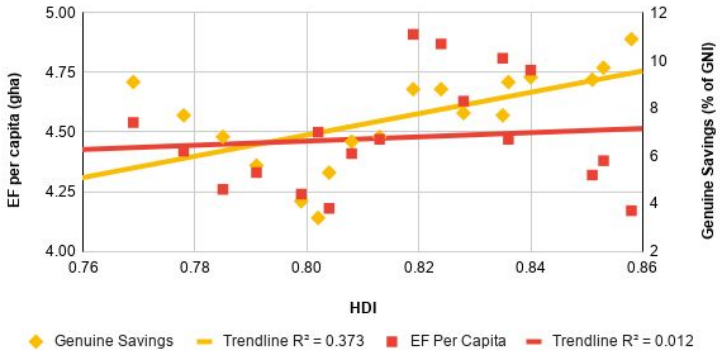


Figure 7e. Trends of the Correlation of Population vs Genuine Savings & Ecological Footprint in Poland

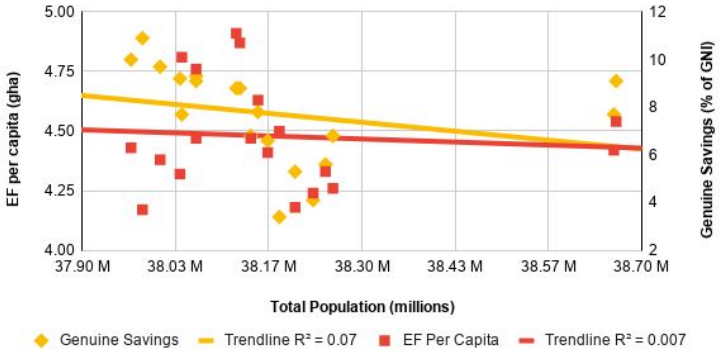


Table 7. CORRELATION OF THE VARIABLES IN POLAND

	ECOLOGICAL FOOTPRINT	GENUINE SAVINGS
GNI PER CAPITA		
Pearson Correlation (r)	0.349	0.706**
Sig. P (2-tailed)	0.143	0.001
N	19	19
HDI		
Pearson Correlation (r)	0.109	0.610**
Sig. P (2-tailed)	0.656	0.006
N	19	19
POPULATION		
Pearson Correlation (r)	-0.082	-0.264
Sig. P (2-tailed)	0.740	0.275
N	19	19

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

SWEDEN

Economic Indicators (figure 8a)

GNI per capita growth in Sweden has a similar scenario with the above countries, in that it has an increasing trend and moderately declined in the last periods of the study. Its HDI growth, however, is different from the other countries as it has an unstable trend. Nonetheless, just like its Scandinavian neighbor, Swedes enjoy their highest quality of life from 2013 onwards.

Sustainability Indicators (figure 8b)

Sweden has the highest GS value among all the selected developed countries. Be that as it may, her GS has an unstable trendline, reaching its zenith in 2007 with a value of 22.7 before swiftly declining by almost 30% two years later. Currently (2016), its value is only 2.16% more than that of 1998. The country's EF has a somewhat similar growth pattern with its GS, peaking in 2005. Although Swedish's demand for and consumption of natural capital is slightly increasing, their biocapacity, however, has a steady decrease. Between the years 1998 to 2016, it shifted from 10.93 gha to 9.55 gha respectively.

Figure 8a. Trends of GNI per capita and HDI in Sweden

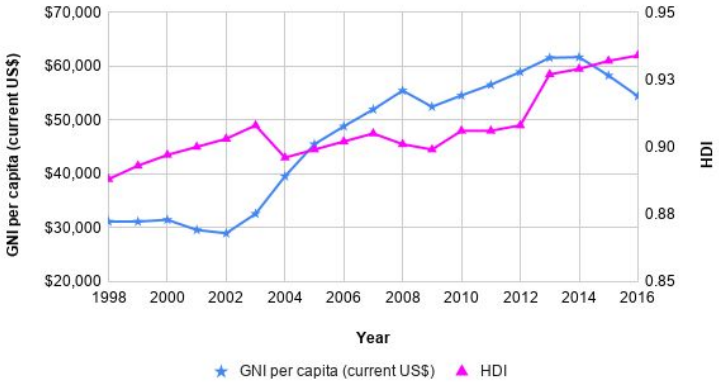
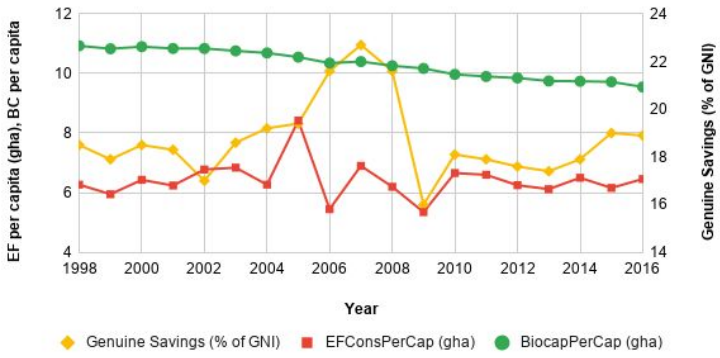


Figure 8b. Trends of Genuine Savings, Ecological Footprint & Biocapacity in Sweden



Correlation of the variables

Sweden is the only European country in this study that has an ecological reserve, making the list of countries with ecological reserves to three. Hence, with an ecological reserve and a positive GS, Sweden joins Australia and Canada as countries following strong sustainable development.

With the exception of a few cases, the EF in Sweden is more or less the same, while its GNI per capita and HDI are increasing. This led to a no significant correlation between the economic indicators and EF(figure 8c, 8d & table 8). Likewise, due to an unstable GS trend, the same is true for the correlation between it and economic indicators.

Figure 8c. Trends of the Correlation of GNI Per Capita vs Genuine Savings & Ecological Footprint in Sweden

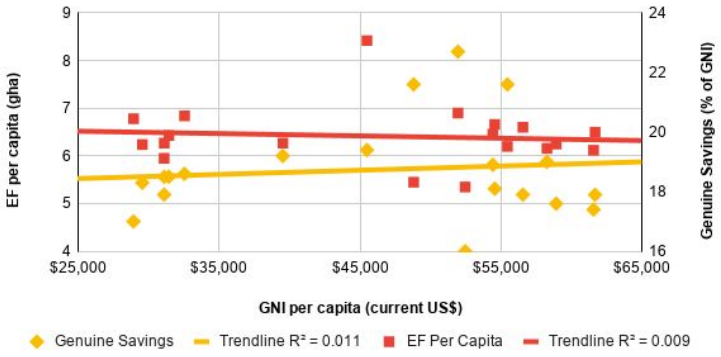
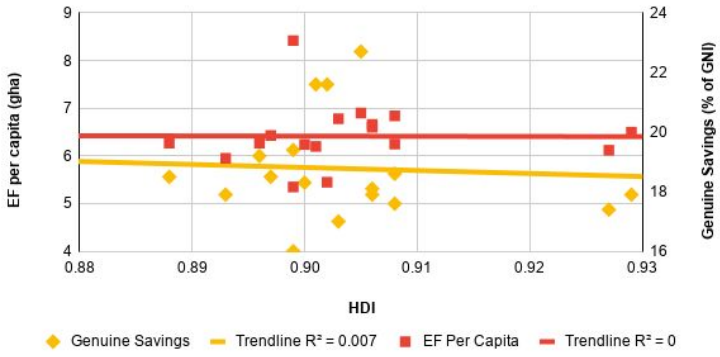


Figure 8d. Trends of the Correlation of HDI vs Genuine Savings & Ecological Footprint in Sweden



The population of Sweden has an increase of only 12% in 18 years (figure 8e). This increase does not have any important correlation with either the country's EF or GS.

Figure 8e. Trends of the Correlation of Population vs Genuine Savings & Ecological Footprint in Sweden

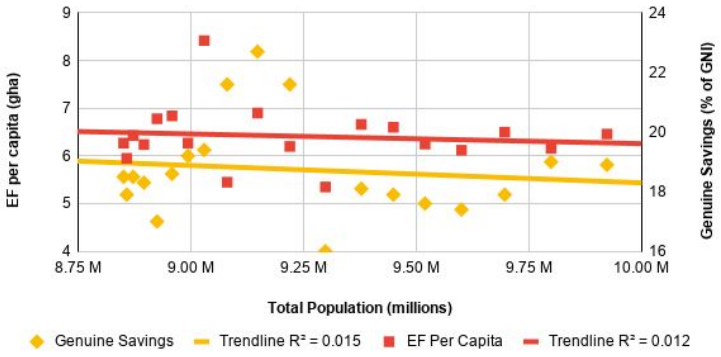


Table 8. CORRELATION OF THE VARIABLES IN SWEDEN

	ECOLOGICAL FOOTPRINT	GENUINE SAVINGS
GNI PER CAPITA		
Pearson Correlation (r)	-0.094	0.103
Sig. P (2-tailed)	0.702	0.674
N	19	19
HDI		
Pearson Correlation (r)	-0.008	-0.083
Sig. P (2-tailed)	0.974	0.736
N	19	19
POPULATION		
Pearson Correlation (r)	-0.110	-0.121
Sig. P (2-tailed)	0.653	0.621
N	19	19

UNITED KINGDOM

Economic Indicators (figure 9a)

Over the study period, Uk's GNI per capita has almost doubled its value of 1998 in 2016. After a decade, the country reached its climax with an 81% increase in 2008. However, they could not keep up the trend and ultimately started declining a year after. Apart from the years 2011-12, the country's HDI has a uniform growth. British in 2016 only enjoyed 7.37% quality of life more than their colleagues 18 years ago.

Sustainability Indicators (figure 9b)

Again, the UK's GS strikingly dropped by nearly 74% in 2009, with an unstable trend. Their EF had a slightly increasing trend in the first decade and a moderate declining trend afterward. Biocapacity on the other side remains more or less the same with only a 0.24 gha reduction in 18 years. In 1998, the United Kingdom had an ecological deficit of 4.16 gha. This only reduced by 0.88 gha in 2016.

Figure 9a. Trends of GNI per capita and HDI in United Kingdom

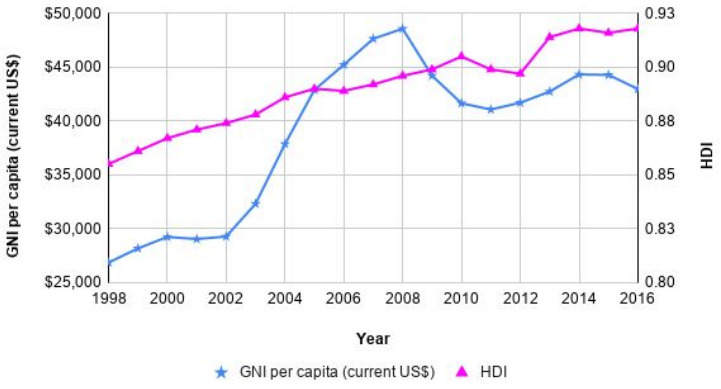
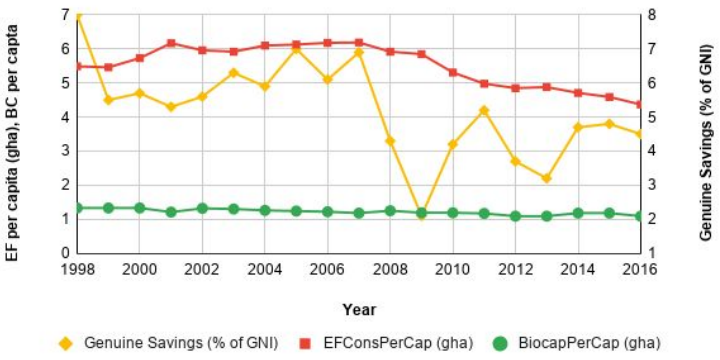


Figure 9b. Trends of Genuine Savings, Ecological Footprint & Biocapacity in United Kingdom



Correlation of the variables

Brits demand and consumption of natural resources and ecosystem services exceeds their country's budget for the supply of these capitals. However, with positive GS, the country's development is sustainable but weak. With decreasing GS coupled with a slow declining ecological footprint, the country's route to strong sustainability is far from close.

Figure 9c. Trends of the Correlation of GNI Per Capita vs Genuine Savings & Ecological Footprint in United Kingdom

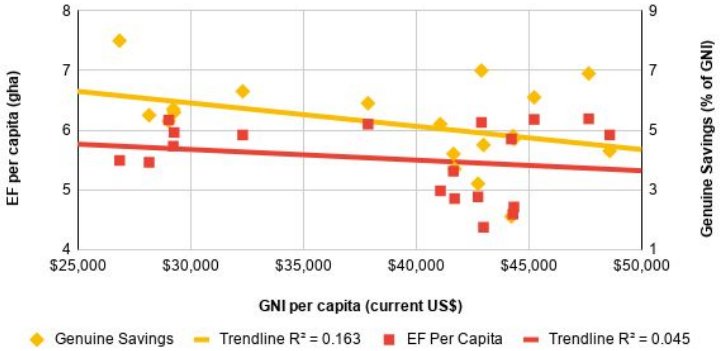
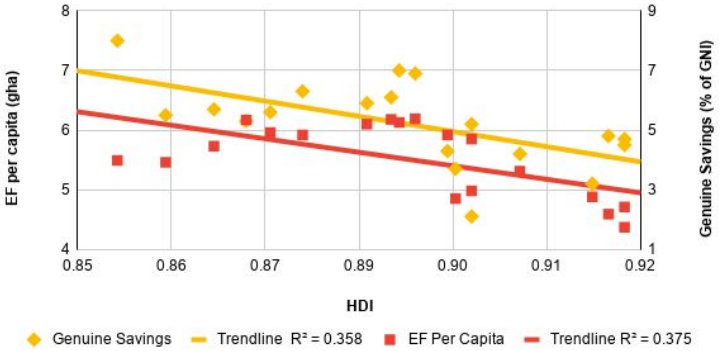


Figure 9d. Trends of the Correlation of HDI vs Genuine Savings & Ecological Footprint in United Kingdom



Just like Sweden and the Netherlands, with R^2 values of less than 0.2, there is no serious correlation between gross national income per person in the United Kingdom, with either GS or EF (figure 9c & table 9). Notwithstanding, the quality of life in the country, negatively correlates significantly with both their sustainability indicators all at a level of 0.01 (figure 9d & table 9).

The United Kingdom joined the few countries that have an impressive correlation between their population growth and the demand for and consumption of natural capital. The correlation between population and EF has an R^2 of 0.619 (figure 9e), which is significant at a 0.01 level (table 9).

Figure 9e. Trends of the Correlation of Population vs Genuine Savings & Ecological Footprint in United Kingdom

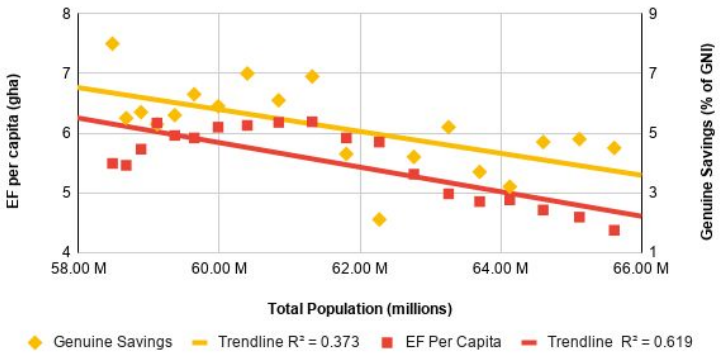


Table 9. CORRELATION OF THE VARIABLES IN UNITED KINGDOM

	ECOLOGICAL FOOTPRINT	GENUINE SAVINGS
GNI PER CAPITA		
Pearson Correlation (r)	-0.212	-0.404
Sig. P (2-tailed)	0.383	0.086
N	19	19
HDI		
Pearson Correlation (r)	-0.612**	-0.598**
Sig. P (2-tailed)	0.005	0.007
N	19	19
POPULATION		
Pearson Correlation (r)	-0.787	-0.610**
Sig. P (2-tailed)	0.000	0.006
N	19	19

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

UNITED STATES OF AMERICA

Economic Indicators (figure 10a)

Both the HDI and gross national income per person in the United States continuously increase over the years. The average gross income of each American in 2016 was $25,150 more than those in 1998. However, there was less than a 4% increase in their HDI.

Sustainability Indicators (figure 10b)

The EF of the USA has shifted from 10.48 gha in 1998 to 8.1 gha in 2016. That is a 22.71% decrease against an 8.06% decline in their biocapacity. Between 1998 to 2005, America had a

uniform decrease in her GS, which later fell off by 84% in 2009. The country soon recovered after but could not catch up with its initial value up to 2016.

Figure 10a. Trends of GNI per capita and HDI in United States

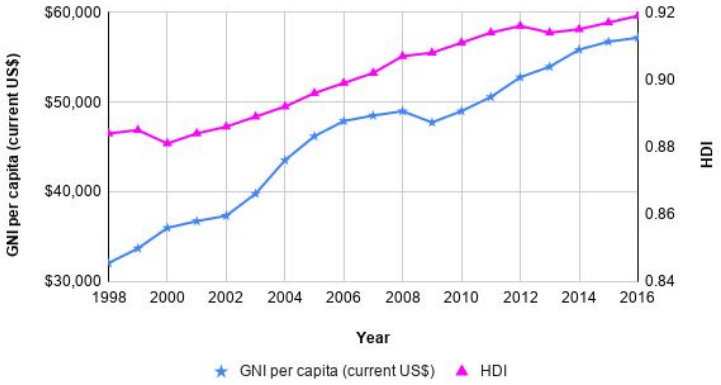
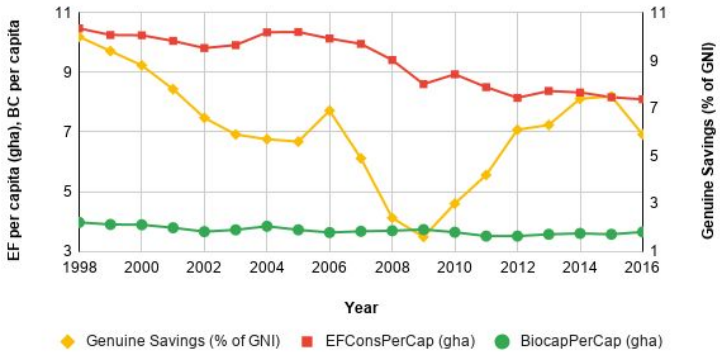


Figure 10b. Trends of Genuine Savings, Ecological Footprint & Biocapacity in United States

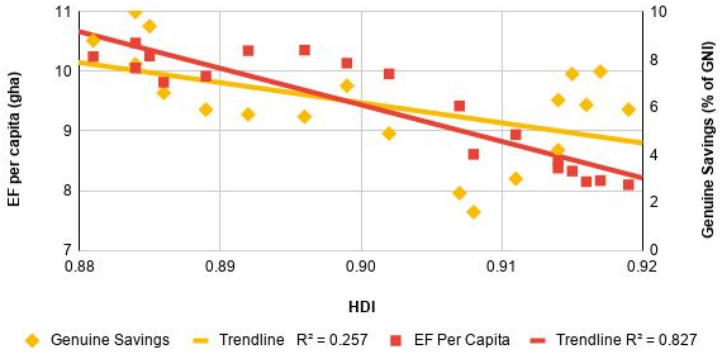


Correlation of the variables

With a huge ecological deficit coupled with positive GS, the United States of America is following weak sustainable development. Americans have an ecological debt of 4.45 gha (2016), however, on the bright side, its EF is decreasing at a higher rate than her biocapacity. Thus, the country's development is gradually leading to strong sustainability.

Figure 10c. Trends of the Correlation of GNI Per Capita vs Genuine Savings & Ecological Footprint in United States

Figure 10d. Trends of the Correlation of HDI vs Genuine Savings & Ecological Footprint in United States



The high demand for and consumption of natural resources and ecosystem services in the USA strongly correlates with both their income level and quality of life at a 0.01 level (figure 10c, 10d & table 10). Likewise, the increase in their income and HDI was accompanied by a decrease in

the country's GS with negative correlations of -0.470 for GNI and -0.507 for HDI. Although, these might be regarded as weak correlations, yet, they are all significant at a 0.05 level.

The United States of America is one of the most populated countries in the world (WPR, 2020) with a uniform growth trend. From 1998 to 2016, her population shifted from 275.85 to 322.94 million people (figure 10e). This 17% increase strongly correlates by -0.913 with their EF. Although weak, population growth in the USA also has an important correlation with their GS.

Figure 10e. Trends of the Correlation of Population vs Genuine Savings & Ecological Footprint in United States

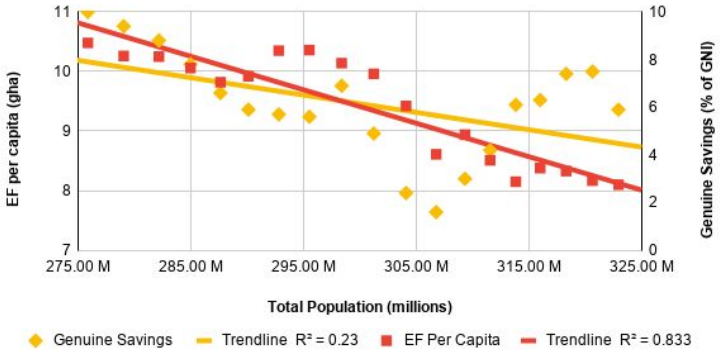


Table 10. CORRELATION OF THE VARIABLES IN UNITED STATES

	ECOLOGICAL FOOTPRINT	GENUINE SAVINGS
GNI PER CAPITA		
Pearson Correlation (r)	-0.830**	-0.470*
Sig. P (2-tailed)	0.000	0.042
N	19	19
HDI		
Pearson Correlation (r)	-0.909**	-0.507*
Sig. P (2-tailed)	0.000	0.027
N	19	19
POPULATION		
Pearson Correlation (r)	-0.913**	-0.480*
Sig. P (2-tailed)	0.000	0.038
N	19	19

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

Table A: Summary of the findings in developed countries

SN:	Country	Type of SD	Correlations					
			GNI vs EF	GNI vs GS	HDI vs EF	HDI vs GS	Pop vs EF	Pop vs GS
1.	Australia	Strong	-0.55*	0.14	-0.50*	0.07	-0.60**	-0.01
2.	Canada	Strong	-0.52*	-0.32	0.55*	-0.38	-0.66**	-0.51*
3.	Denmark	Weak	-0.81**	0.03	-0.83**	0.22	-0.92**	0.32
4.	Germany	Weak	-0.58**	0.84**	-0.74**	0.79**	0.29	-0.47*
5.	Japan	Weak	-0.50*	-0.76**	-0.86**	-0.70**	-0.31	-0.55*
6.	Netherlands	Weak	-0.06	-0.24	-0.35	-0.24	-0.40	-0.32
7.	Poland	Weak	0.35	0.71**	0.11	0.61**	-0.08	-0.26
8.	Sweden	Strong	-0.09	0.10	-0.00	-0.08	-0.11	-0.12
9.	United Kingdom	Weak	-0.21	-0.40	-0.61**	-0.60**	-0.79**	-0.61**
10.	United States	Weak	-0.83**	-0.47*	-0.91**	-0.51*	-0.91**	-0.48*

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

4.2. LEAST DEVELOPED COUNTRIES

BANGLADESH

Economic indicators (figure 11a)

Bangladesh had a uniformly consistent increase in her GNI per capita throughout the study period and the same is true for that of her HDI. The average gross income of each individual in Bangladesh more than tripled after 18 years. This was accompanied by a 32% increase in their HDI. It is fair to say that there is a huge disparity between the income level and quality of life of Bangladeshis in the late 1990s and those in the last couple of years.

Sustainability Indicators (figure 11b)

Contrary to the developed countries, Bangladesh is having an upward trend in all her sustainability indicators. The EF per person in the country increased by almost 62%. In addition, its biocapacity also had an increase of 17.%. Shockingly, Bangladesh's GS is not only increasing but higher than that of all the developed countries in this study.

Figure 11a. Trends of GNI per capita and HDI in Bangladesh

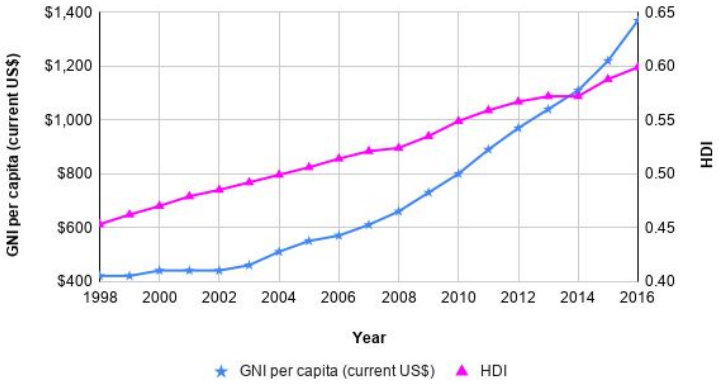
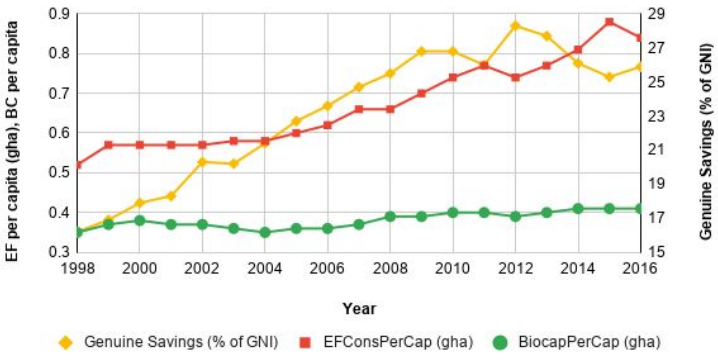


Figure 11b. Trends of Genuine Savings, Ecological Footprint & Biocapacity in Bangladesh



Correlation of the variables

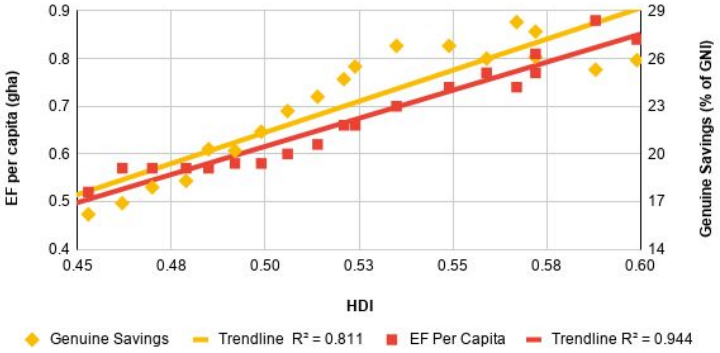
In 1998, Bangladesh had an ecological deficit of 0.17 gha, which shifted to 0.43 gha in 2016. Nevertheless, due to high positive GS, the country is following a weak sustainable development.

However, with an increasing EF, they are not moving towards a strong sustainable development anytime soon.

As all indicators have an increasing trend, there is a highly strong positive correlation between the economic conditions and sustainability indicators all at a level of 0.01 (table 11). Thus, an increase in the income level and quality of life of Bangladeshis is corresponding to an increase in their demand for and consumption of natural resources and ecosystem services. The correlation between both GNI per capita and HDI with EF has an extortionate R^2 of 0.94 (figure 11c & 11d). There is also a similar relationship between them and GS.

Figure 11c. Trends of the Correlation of GNI Per Capita vs Genuine Savings & Ecological Footprint in Bangladesh

Figure 11d. Trends of the Correlation of HDI vs Genuine Savings & Ecological Footprint in Bangladesh



Bangladesh is one of the top 10 most populated countries in the world (WPR, 2020) in general, and the second most populated in this study. Over the study period, Bangladesh's population increased by more than 35 million people (figure 11e).

This growth strongly and significantly correlates with EF and GS with R^2 of 0.90 and 0.87 respectively. The USA and Bangladesh are one of the most populated countries in the world in general and this study in particular. However, whereas population growth correlates negatively with EF in the US, the population in Bangladesh has a positive relationship with EF (Table 11).

Figure 11e. Trends of the Correlation of Population vs Genuine Savings & Ecological Footprint in Bangladesh

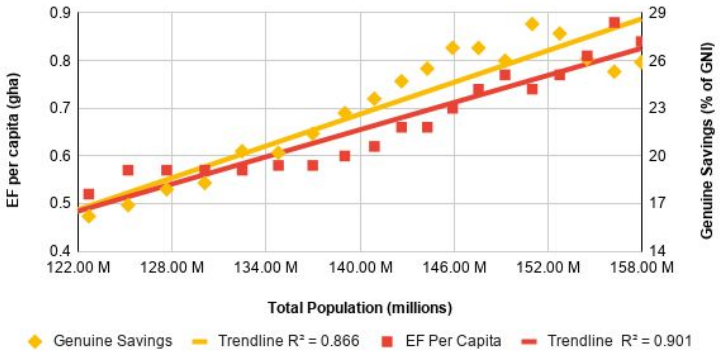


Table 11. CORRELATION OF THE VARIABLES IN BANGLADESH

	ECOLOGICAL FOOTPRINT	GENUINE SAVINGS
GNI PER CAPITA		
Pearson Correlation (r)	0.970**	0.765**
Sig. P (2-tailed)	0.000	0.000
N	19	19
HDI		
Pearson Correlation (r)	0.971**	0.900**
Sig. P (2-tailed)	0.000	0.000
N	19	19
POPULATION		
Pearson Correlation (r)	0.949**	0.930**
Sig. P (2-tailed)	0.000	0.000
N	19	19

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

BENIN

Economic indicators (figure 12a)

The Republic of Benin has a similar growth in her economic indicators to that of Bangladesh. The country's GNI per capita increased from $370 in 1998 to $1,270 in 2014 before declining in 2016. Although HDI in both countries increased by almost 33%, Bangladesh however has a better quality of life than Benin.

Sustainability Indicators (figure 12b)

Between the periods 1998-2001, Benin had an ecological reserve. However, due to their highly increasing demand for and consumption of natural capital, this trend reversed in 2002, and ever since, their EF has an upward trend with a total increase of 0.26 gha against a 0.34 gha decrease in their biocapacity. GS in the West African country has an unstable growth over the study period. Between 1998 to 2014, it shifted from -0.5 to a whopping 4.3 and suddenly dropped woefully to -3.4 in 2016.

Correlation of the variables

Benin is so far the first country with a negative GS trend. This is coupled with an ecological deficit from 2002 onwards. Thus the development in Benin, instead of being weakly sustainable,

it is rather unsustainable. Moreover, with the current growth trends of their sustainability indicators, Beninese are moving far from sustainable development in general.

Figure 12a. Trends of GNI per capita and HDI in Benin

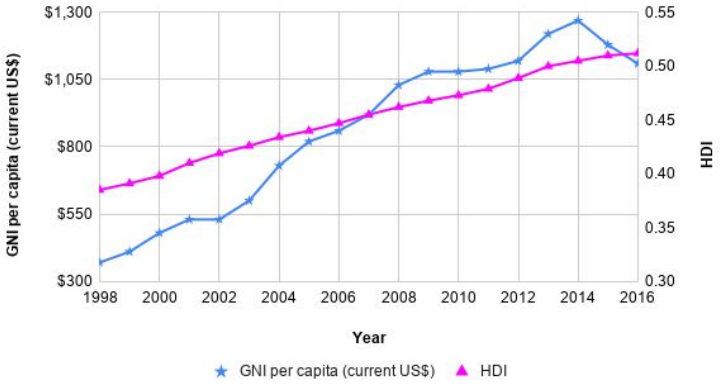
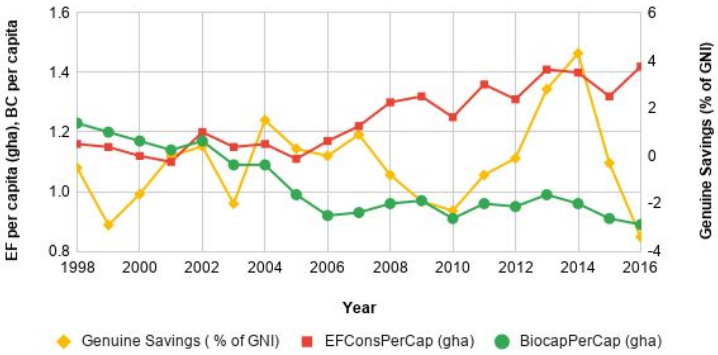


Figure 12b. Trends of Genuine Savings, Ecological Footprint & Biocapacity in Benin



Due to the increasing trend in all her indicators except GS, there is a pretty strong positive correlation between the economic indicators and EF (figure 12c & 12d). Both GNI per capita and HDI have a whopping correlation of 0.86 and 0.88 respectively with EF. Nonetheless, because of the instability in the GS growth trend, it does not have an important correlation with any of the indicators (table 12)

Figure 12c. Trends of the Correlation of GNI Per Capita vs Genuine Savings & Ecological Footprint in Benin

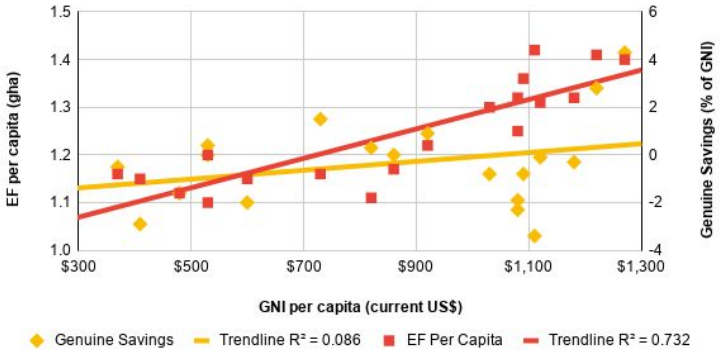
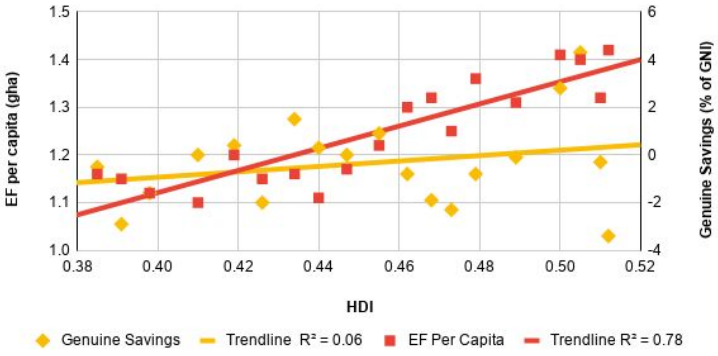


Figure 12d. Trends of the Correlation of HDI vs Genuine Savings & Ecological Footprint in Benin



Benin is one of the less populated countries in Africa in general and this study in particular. The increase in the sustainability indicators in overall was accompanied by a 68% growth in the country's population (figure 12e). The relationship between this growth correlates positively

with EF with an R^2 of 0.81. However, similar to that of GNI per capita and HDI, there is no significant connection between population growth and GS (Table 12).

Figure 12e. Trends of the Correlation of Population vs Genuine Savings & Ecological Footprint in Benin

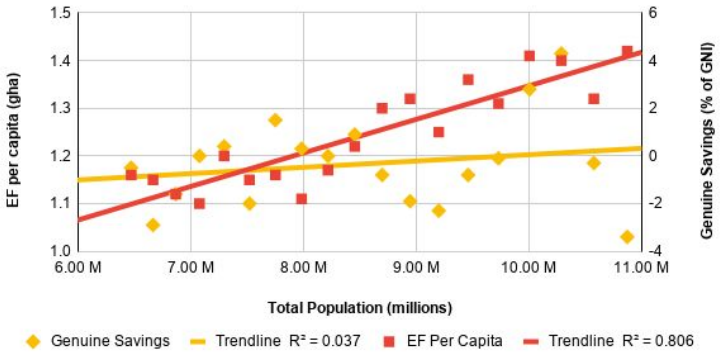


Table 12. CORRELATION OF THE VARIABLES IN BENIN

	ECOLOGICAL FOOTPRINT	GENUINE SAVINGS
GNI PER CAPITA		
Pearson Correlation (r)	0.855**	0.293
Sig. P (2-tailed)	0.000	0.224
N	19	19
HDI		
Pearson Correlation (r)	0.883**	0.245
Sig. P (2-tailed)	0.000	0.312
N	19	19
POPULATION		
Pearson Correlation (r)	0.898**	0.192
Sig. P (2-tailed)	0.000	0.431
N	19	19

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

BURUNDI

Economic indicators (figure 13a)

In the first quarter of the study period, Burundi's GNI per person had a downward trend until 2004, after which it rapidly increased by 80% in 2016. However, this increase was only $120 in real value, making Burundians one of the poorest people in this study. The country's HDI on the other hand has a more stable and consistent growth with Burundians in 2016 having 49% better quality of life than their fellows in 1998.

Sustainability Indicators (figure 13b)

Both the EF and biocapacity in Burundi has an unsteady downward trend. In 1998, Burundians had an ecological debt of 0.46 gha, which decreased to 0.28 gha in 2016. GS in the East African country is remarkably low with an unsteady growth. In 2016, it shifted from -40.1 (1998) to -19. This shows how the country is not reinvesting revenue from natural capital into human capital.

Correlation of the variables

Overall, Burundi's EF surpasses its biocapacity and has high negative GS. Thus, the country is on a path of unsustainability. On the brighter side, Burundians are reducing their demand for and consumption of natural capital. Notwithstanding, with very low counterbalancing investments in human capital, the country is far from attaining a weak sustainable development.

Figure 13a. Trends of GNI per capita and HDI in Burundi

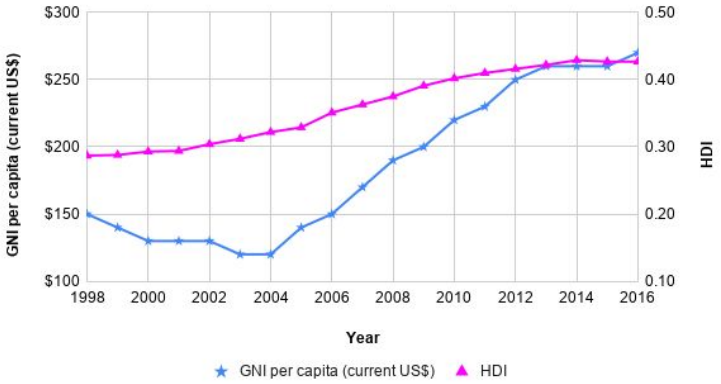
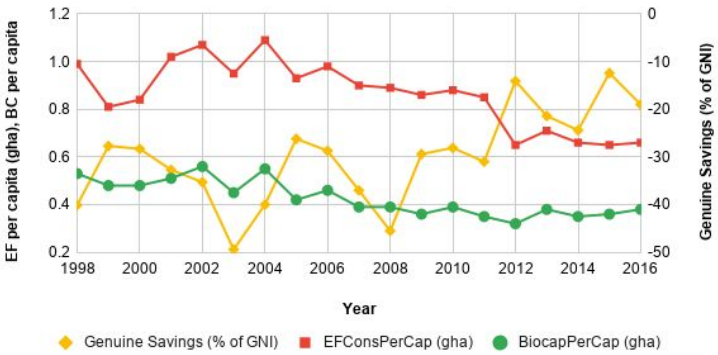


Figure 13b. Trends of Genuine Savings, Ecological Footprint & Biocapacity in Burundi



Just like her fellow LDCs, the economic conditions in Burundi have significant correlations with her EF all at levels of 0.01. The correlation between GNI per capita and HDI with EF has an R^2 of 0.63 and R of -0.751 respectively (figure 13c & table 13). There is also a similar correlation between them and GS (figure 13c, 13d & table 13).

Figure 13c. Trends of the Correlation of GNI Per Capita vs Genuine Savings & Ecological Footprint in Burundi

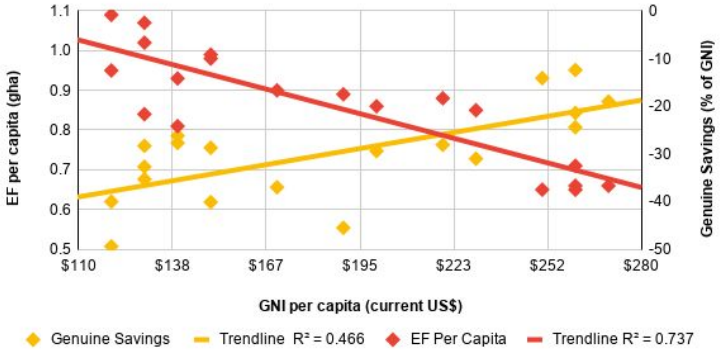
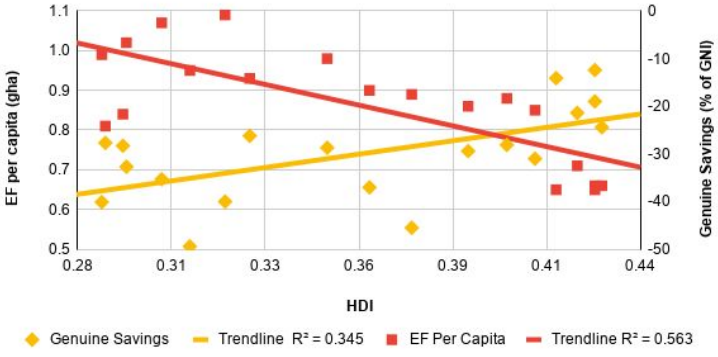


Figure 13d. Trends of the Correlation of HDI vs Genuine Savings & Ecological Footprint in Burundi



Burundi has a consistent growth in her population throughout the study period. Her population shifted from 6.2 (1998) to 10.5 million (2016) (figure 13e). This increase has a correlation of 0.792 with their EF and 0.642 with counterbalancing investments in human capital (table 13)

Figure 13e. Trends of the Correlation of Population vs Genuine Savings & Ecological Footprint in Burundi

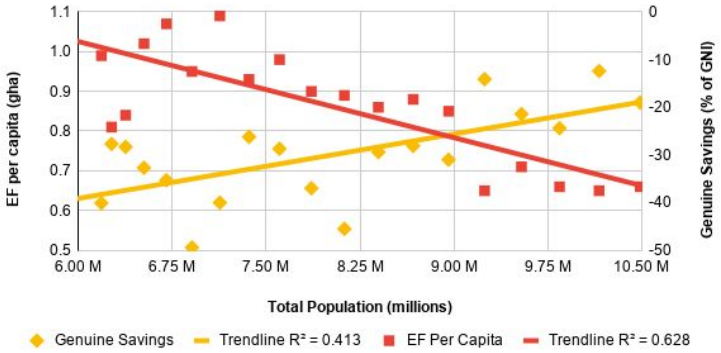


Table 13. CORRELATION OF THE VARIABLES IN BURUNDI

	ECOLOGICAL FOOTPRINT	GENUINE SAVINGS
GNI PER CAPITA		
Pearson Correlation (r)	-0.859**	0.682**
Sig. P (2-tailed)	0.000	0.001
N	19	19
HDI		
Pearson Correlation (r)	-0.751**	0.588**
Sig. P (2-tailed)	0.000	0.008
N	19	19
POPULATION		
Pearson Correlation (r)	-0.792**	0.642**
Sig. P (2-tailed)	0.000	0.003
N	19	19

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

CAMBODIA

Economic indicators (figure 14a)

All the economic indicators in Cambodia have a uniformly increasing trend. The average GNI of each Cambodian has a total increase of $850 which was just $100 below her Asian counterpart. However, they have an increase of 10% in their HDI more than that of Bangladesh.

Sustainability Indicators (figure 14b)

Another interesting similarity between the two Asian countries so far is that they all have increasing trends in their indicators as opposed to their fellow LDCs in Africa. Cambodia's EF increased by more than 50% while its biocapacity also enlarged by 0.28 gha. Between the periods 1998 to 2010, Cambodia had a low ecological deficit, with only 0.04 gha (1998) and 0.09 (2010). However, this amount rapidly rushed to a whopping 0.27 in 2016. Although unsteady, GS in Cambodia also has an upward trend shifting from -4.5 in 1998 to 10.3 in 2016.

Correlation of the variables

Though the country's genuine savings has increased positively, Cambodia is having an ecological deficit, which makes their development related to weak sustainability just like her fellow Asian counterparts. Nevertheless, with a rapidly increasing EF and unstable genuine savings, Cambodians are not moving towards a strong sustainable development.

Figure 14a. Trends of GNI per capita and HDI in Cambodia

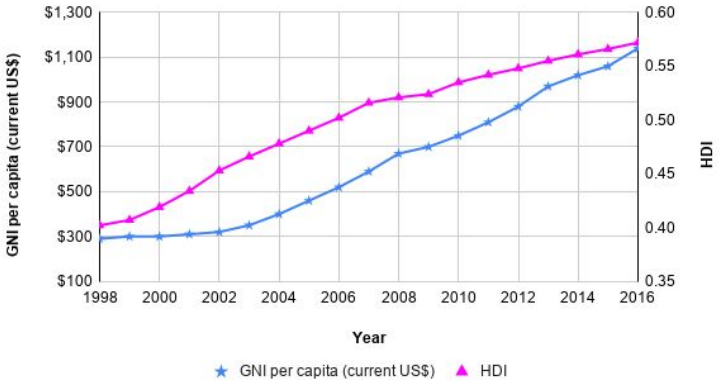
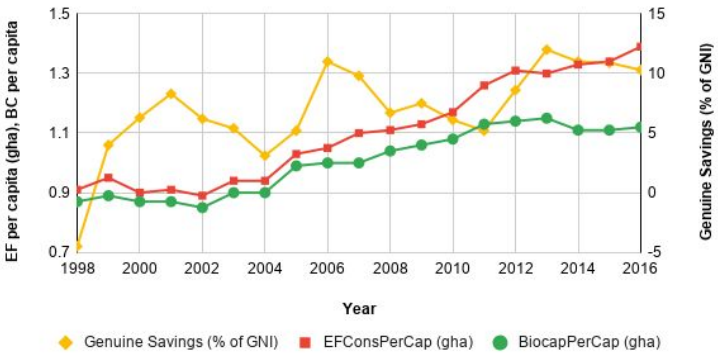


Figure 14b. Trends of Genuine Savings, Ecological Footprint & Biocapcity in Cambodia



Similar to Bangladesh, the country is having a strong significant correlation between her economic indicators and population with the sustainability indicators. All the correlations are positive in these two countries, as opposed to negative correlations in other LDCs. GNI per capita and HDI in Cambodia correlate with EF by a whopping R^2 of 0.98 and 0.86 respectively (figure 14c & 14d). Although weak, the economic indicators also have an important relationship with GS.

Figure 14c. Trends of the Correlation of GNI Per Capita vs Genuine Savings & Ecological Footprint in Cambodia

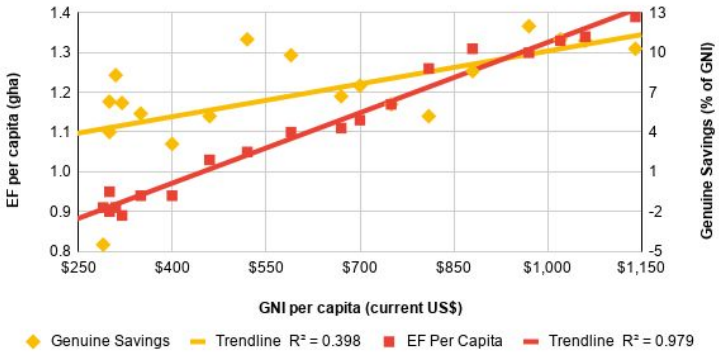
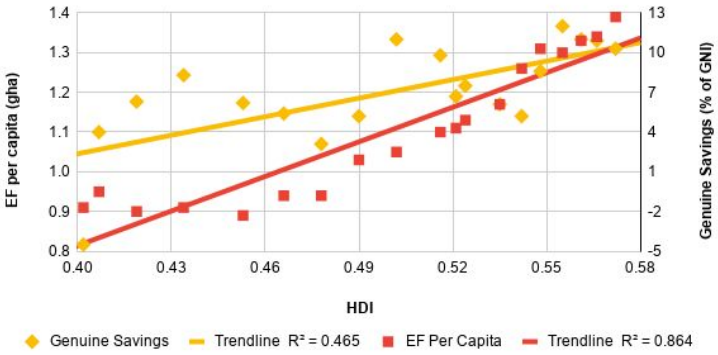


Figure 14d. Trends of the Correlation of HDI vs Genuine Savings & Ecological Footprint in Cambodia



Cambodia has the lowest total population among the selected Asian countries. Yet, the country has a total increase of 36% in 18 years (figure 14e). The growth in population has an R^2 of 0.93 with EF and r of 0.695 with genuine savings, all significant at a point 0.01 level (table 14).

Figure 14e. Trends of the Correlation of Population vs Genuine Savings & Ecological Footprint in Cambodia

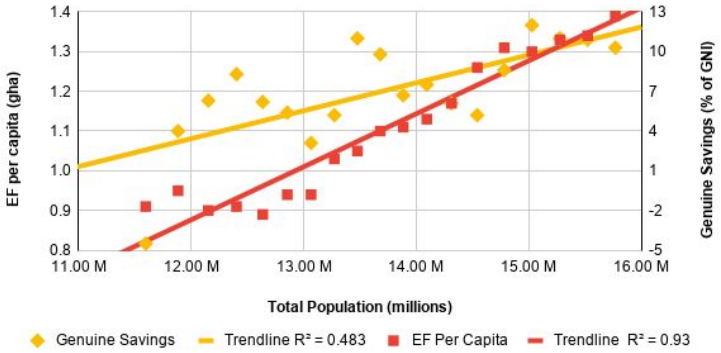


Table 14. CORRELATION OF THE VARIABLES IN CAMBODIA

	ECOLOGICAL FOOTPRINT	GENUINE SAVINGS
GNI PER CAPITA		
Pearson Correlation (r)	0.989**	0.631**
Sig. P (2-tailed)	0.000	0.004
N	19	19
HDI		
Pearson Correlation (r)	0.929**	0.682**
Sig. P (2-tailed)	0.000	0.001
N	19	19
POPULATION		
Pearson Correlation (r)	0.964**	0.695**
Sig. P (2-tailed)	0.000	0.001
N	19	19

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

HAITI

Economic indicators (figure 15a)

Haiti is the only country from the Americas that is classified under the least developed countries (UN, 2019). Although not consistent, the country has an increasing trend in her GNI per capita. Over the study period, it increased from $400 (1998) to $780 in 2016. Its HDI on the other hand has a steady growth.

Sustainability Indicators (figure 15b)

Though both are increasing, there is a huge disparity between the EF and biocapacity in Haiti. The former French colony has an ecological deficit of 0.36 gha in 2016 with only a 13% increase in her EF. So far, all the LDCs have an unsteady growth in their GS apart from Bangladesh. Haiti's GS decreased by 25% in 2014 before inclining to 22.1 gha in 2016. Be that as it may, Haiti and Bangladesh so far have the highest GS scores than any other country in this study.

Correlation of the variables

The EF in Haiti far outshined its available natural resources and ecosystem services. However, with positive GS, the country's development is sustainable, although weak. Nonetheless, with increasing ecological footprint and unstable genuine savings, the country is not heading to strong sustainable development, but rather unsustainability.

Figure 15a. Trends of GNI Per Cap and HDI in Haiti

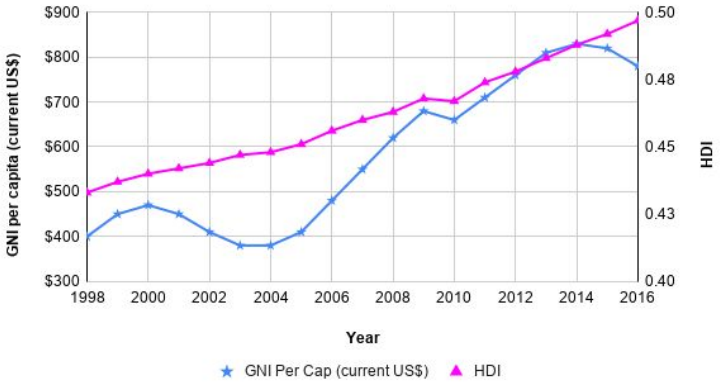
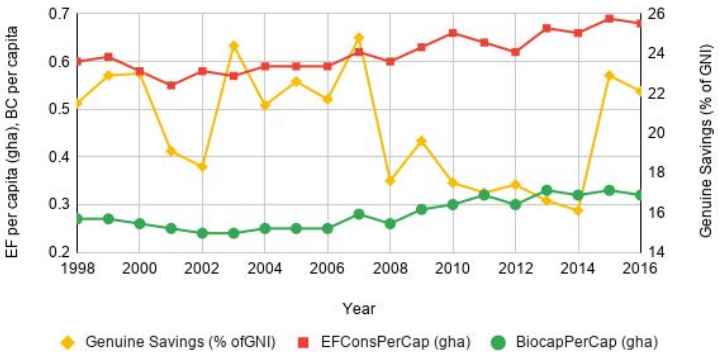


Figure 15b. Trends of Genuine Savings, Ecological Footprint & Biocapacity in Haiti



Similar to her LDC counterparts of Asia, all the economic indicators and population positively and strongly correlate with EF, all significant at a level of 0.01 (figure 15c, 15d, 15e & table 15). Notwithstanding, only GNI per capita has an important correlation with GS in Haiti (table 15).

Figure 15c. Trends of the Correlation of GNI Per Capita vs Genuine Savings & Ecological Footprint in Haiti

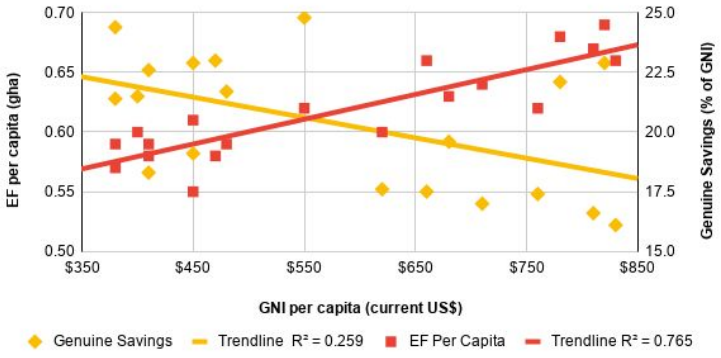
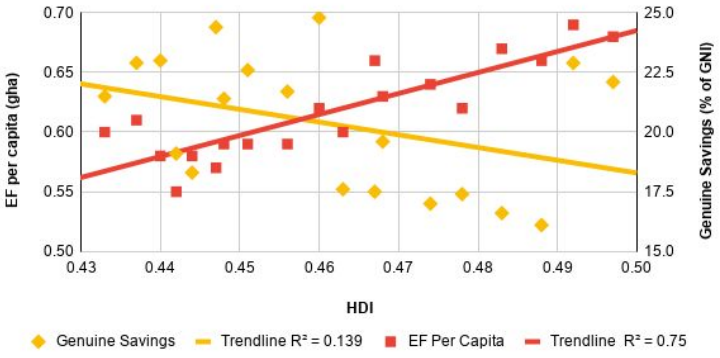


Figure 15d. Trends of the Correlation of HDI vs Genuine Savings & Ecological Footprint in Haiti



The population of Haiti has increased by almost 33% from 8.17 (1998) to 10.84 million (2016) people (figure 15e). This growth has an R^2 of 0.72 with Haitians' demand for and consumption

of natural capital. However, though it correlates negatively with GS, there is no important relationship between the two (Table 15).

Figure 15e. Trends of the Correlation of Population vs Genuine Savings & Ecological Footprint in Haiti

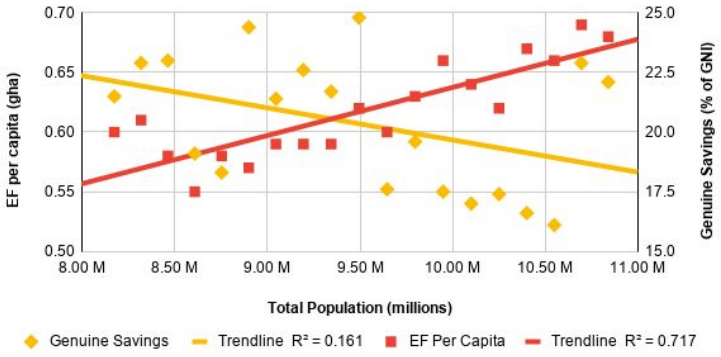


Table 15. CORRELATION OF THE VARIABLES IN HAITI

	ECOLOGICAL FOOTPRINT	GENUINE SAVINGS
GNI PER CAPITA		
Pearson Correlation (r)	0.875**	-0.509*
Sig. P (2-tailed)	0.000	0.026
N	19	19
HDI		
Pearson Correlation (r)	0.866**	-0.373
Sig. P (2-tailed)	0.000	0.116
N	19	19
POPULATION		
Pearson Correlation (r)	0.847**	-0.401
Sig. P (2-tailed)	0.000	0.089
N	19	19

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

MALAWI

Economic indicators (16a)

Malawi has a non-uniform growth in her GNI per person, which peaked at $490 in 2011 and dramatically declined to $340. In comparison, the country's HDI has a steadier growth. Overall it increased by 30% over the study period.

Sustainability Indicators (figure 16b)

Similar to her LDC counterparts, Malawi has an unstable GS trend. The East African country had its highest and only positive GS value in 2007 at 0.7. Nine years later, this value declined remarkably to 24. Both the biocapacity and EF in the landlocked country also have an unsteady growth rate. In 2005, EF and biocapacity declined by 16% and 19% respectively. However, they recovered immediately afterward with a 19% increase for EF and 8% for biocapacity in 2016.

Correlation of the variables

Malawians are living above their ecological budget and are unfortunately not investing enough in human capital either. Thus, making the country's development unsustainable. With similar

growth patterns in their ecological footprint and biocapacity, coupled with decreasing genuine savings, Malawi is not moving towards sustainable development.

Figure 16a. Trends of GNI per capita and HDI in Malawi

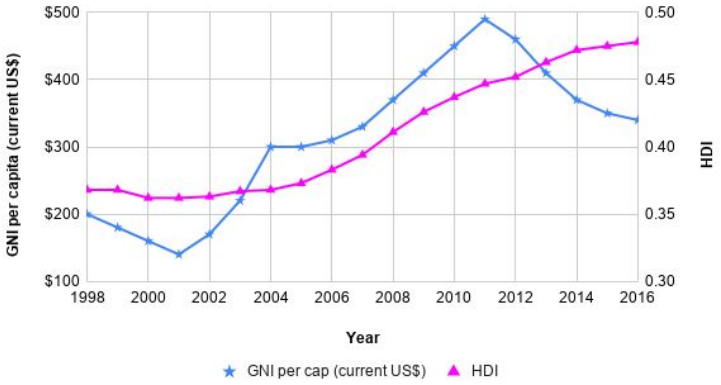
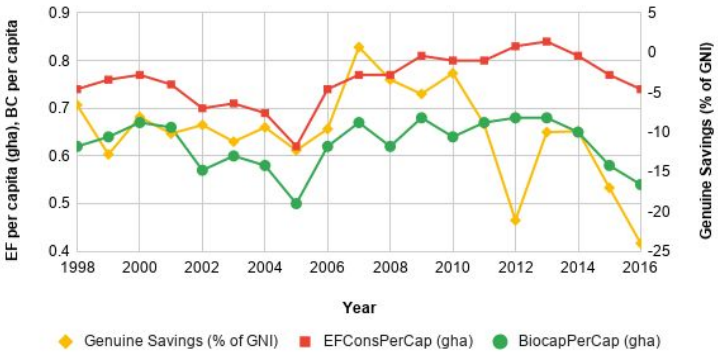


Figure 16b. Trends of Genuine Savings, Ecological Footprint & Biocapacity in Malawi



The correlation between the economic indicators and Ef are weak in Malawi compared to other LDCs (figure 16c & 16d). However, they are all significant at 0.05 for GNI per capita and 0.01 level for HDI (table 16). Nonetheless, there is no important relationship between them and GS.

Like all the other LDCs, Malawi has a consistent growth in its population throughout the study period. Between 1998 to 2016, the population of Malawi shifted from 10.55 to 17.21 million people (figure 16e).

Figure 16c. Trends of the Correlation of GNI Per Capita vs Genuine Savings & Ecological Footprint in Malawi

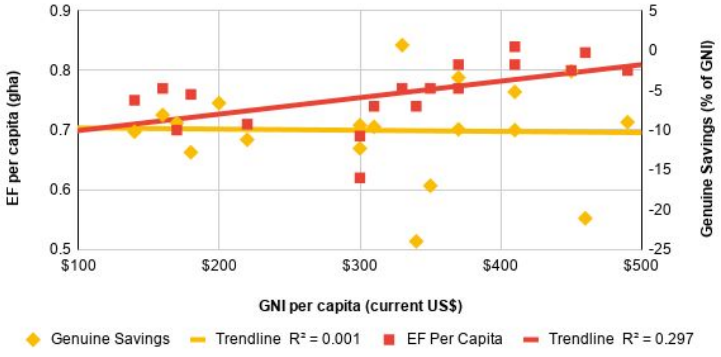
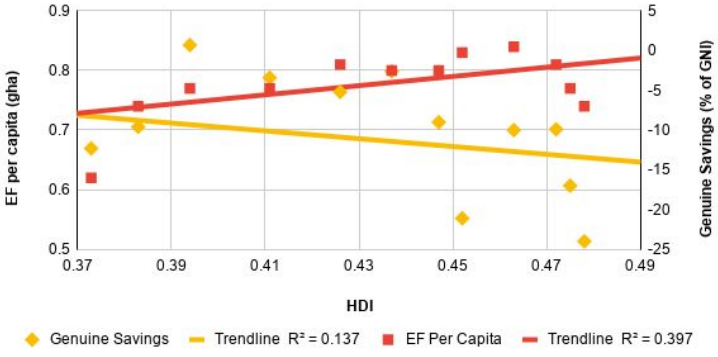


Figure 16d. Trends of the Correlation of HDI vs Genuine Savings & Ecological Footprint in Malawi



This increase corresponds to an R^2 of 0.254 with the country's demand for and consumption of natural capital. Although weak, surprisingly this relationship is significant at a 0.05 level (table 16).

Figure 16e. Trends of the Correlation of Population vs Genuine Savings & Ecological Footprint in Malawi

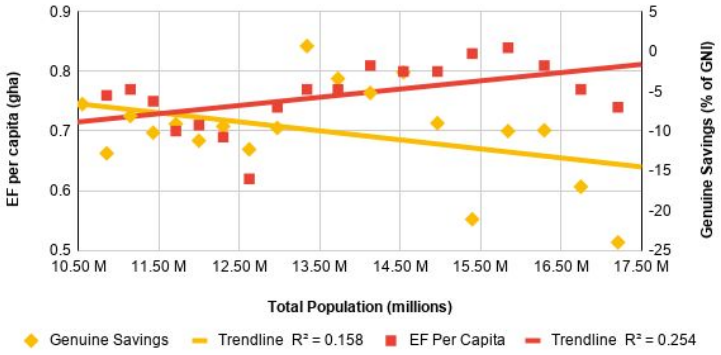


Table 16. CORRELATION OF THE VARIABLES IN MALAWI

	ECOLOGICAL FOOTPRINT	GENUINE SAVINGS
GNI PER CAPITA		
Pearson Correlation (r)	0.547*	-0.027
Sig. P (2-tailed)	0.015	0.913
N	19	19
HDI		
Pearson Correlation (r)	0.631**	-0.370
Sig. P (2-tailed)	0.004	0.119
N	19	19
POPULATION		
Pearson Correlation (r)	0.500*	-0.398
Sig. P (2-tailed)	0.029	0.092
N	19	19

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

NEPAL

Economic indicators (figure 17a)

The small South Asian country has the lowest GNI per capita among her selected Asian fellows. Both the economic indicators in Nepal have a steady increasing trend, with GNI per capita increasing by $560 and HDI by 32% in 2016.

Sustainability Indicators (figure 17b)

GS growth in Nepal is more or less stable than most of the LDCs and it more than doubled in 2016. That being said, Nepal has the highest GS scores than all other countries in this study. Though they are both increasing, the EF in Nepal is increasing faster than their biocapacity after 2010. The country has an ecological debt of 0.51 gha in 2016 as opposed to 0.29 in 1998.

Correlation of the variables

Nepalese ecological footprint exceeds their available biocapacity. Fortunately, the country has a higher positive GS, thus making their development weakly sustainable. On the brighter side, the

country has a rapidly increasing positive genuine savings and slightly inclining biocapacity. Alas, their ecological footprint is increasing than their biocapacity, which unfortunately means they are not gradually moving towards a strong sustainable development.

Figure 17a. Trends of GNI per cap and HDI in Nepal

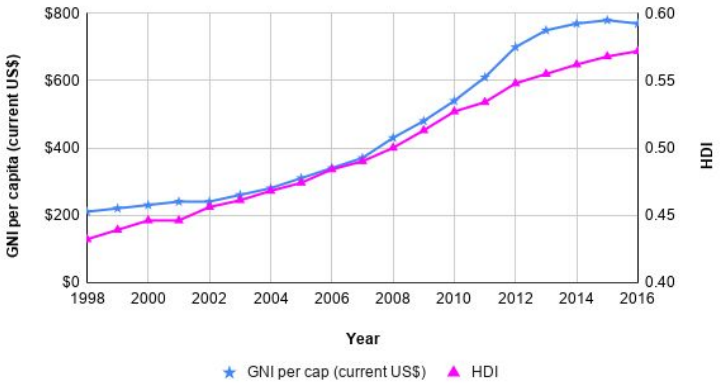
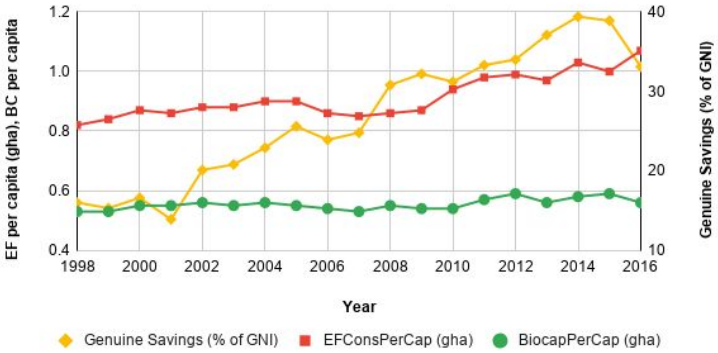


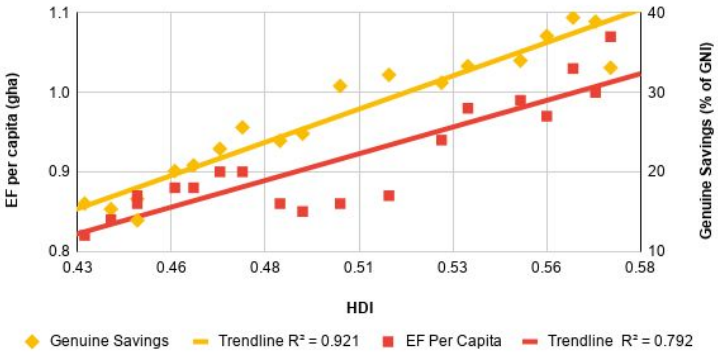
Figure 17b. Trends of Genuine Savings, Ecological Footprint & Biocapacity in Nepal



All the Asian LDCs in this study have an increasing trend in all their indicators. Likewise, the economic indicators and population growth both strongly and positively correlate with both ecological footprint and genuine savings all at a 0.01 level (table 17). The correlation between GNI per capita with EF in Nepal is 0.902 (table 17) and an R^2 of 0.88 with genuine savings (figure 17c). HDI also has a similar correlation with the sustainability indicators.

Figure 17c. Trends of the Correlation of GNI Per Capita vs Genuine Savings & Ecological Footprint in Nepal

Figure 17d. Trends of the Correlation of HDI vs Genuine Savings & Ecological Footprint in Nepal



The population of Nepal has an upward trend with a total increase of 18% in 2016 (figure 17e). It correlates positively with both ecological footprint and genuine savings with R^2 values of 0.50 and 0.84 respectively (figure 17e).

Figure 17e. Trends of the Correlation of Population vs Genuine Savings & Ecological Footprint in Nepal

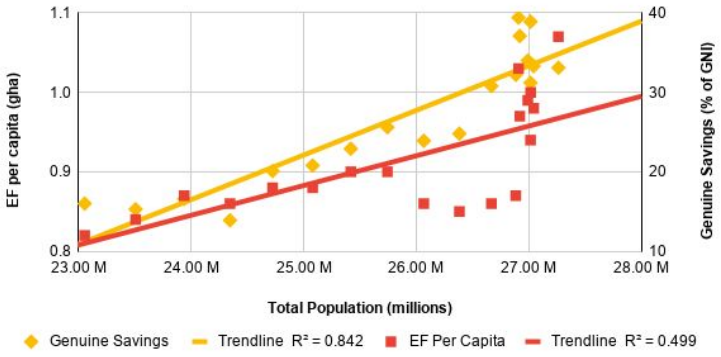


Table 17. CORRELATION OF THE VARIABLES IN NEPAL

	ECOLOGICAL FOOTPRINT	GENUINE SAVINGS
GNI PER CAPITA		
Pearson Correlation (r)	0.902**	0.939**
Sig. P (2-tailed)	0.000	0.000
N	19	19
HDI		
Pearson Correlation (r)	0.890**	0.960**
Sig. P (2-tailed)	0.000	0.000
N	19	19
POPULATION		
Pearson Correlation (r)	0.706**	0.917**
Sig. P (2-tailed)	0.001	0.000
N	19	19

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

NIGER

Economic indicators (figure 18a)

Although it increased by 47%, Niger has the lowest quality of life among all the selected countries of this study. Notwithstanding, with an increase of $260 in 2016, Nigeriens have higher gross income per capita than Malawians and Burundians.

Sustainability Indicators (figure 18b)

There is a similar growth trend in the EF and biocapacity of Niger. They are both unstable and increase and decrease simultaneously. However, between 1998 - 2001, Niger's ecological deficit was far less than the later periods of the study. In the year 2000, the country had an ecological debt of 0.07 gha, against 0.30 gha in 2016. There is a more or less similar growth pattern in their GS too which shifted from -7.8 (1998) to 5 (2016).

Correlation of the variables

Niger's sustainability path is more complicated than any other country in this study as all its sustainability indicators have an unstable growth. Between the periods 1998 -2000; 2002-2004; and 2009, the country had negative GS (figure 18b). Thus we can say that, in the first 6 years of the study, Niger's development was unsustainable. From 2005 onwards (except for 2009) the

country's development was related to weak sustainability. Nonetheless in general, the country is on a path of unsustainable development.

Figure 18a. Trends of GNI per cap and HDI in Niger

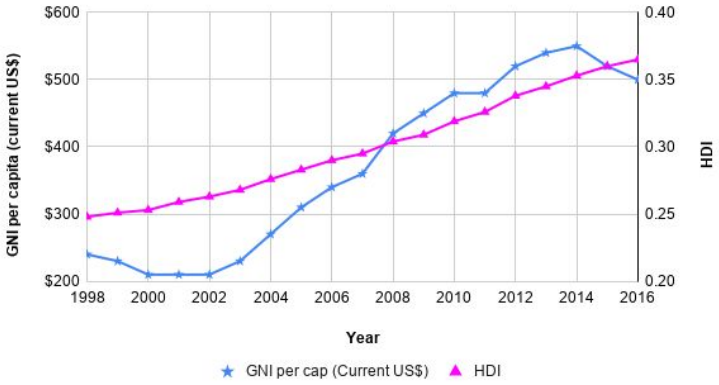
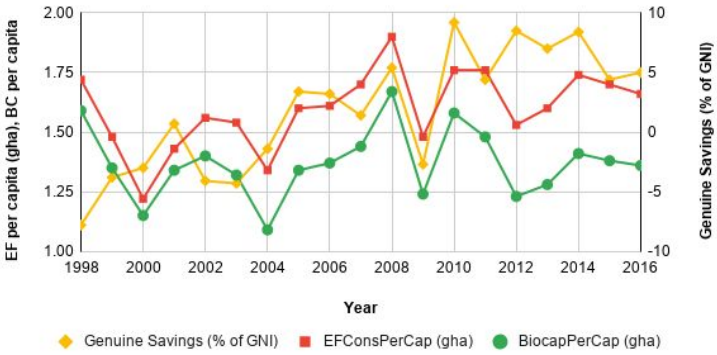


Figure 18b. Trends of Genuine Savings, Ecological Footprint & Biocapacity in Niger



The increase and decrease in their EF correlate weakly with both GNI per capita and HDI (figure 18c & 18d). Though, significant at a level of 0.05 (table 18).

The population of the country, on the other hand, has a steady and consistent growth with an increase of 97% in 2016 (figure 18e). This correlates strongly with Gs at 0.79 and weakly with EF at 0.47 (table 18).

Figure 18c. Trends of the Correlation of GNI Per Capita vs Genuine Savings & Ecological Footprint in Niger

Figure 18d. Trends of the Correlation of HDI vs Genuine Savings & Ecological Footprint in Niger

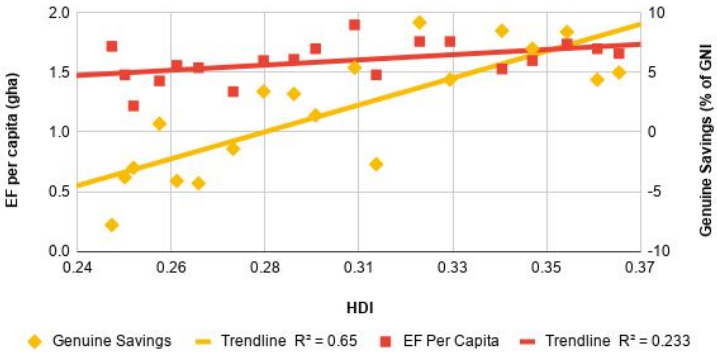


Figure 18e. Trends of the Correlation of Population vs Genuine Savings & Ecological Footprint in Niger

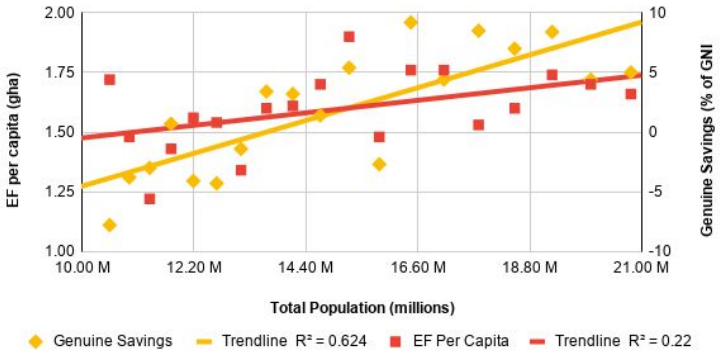


Table 18. CORRELATION OF THE VARIABLES IN NIGER

	ECOLOGICAL FOOTPRINT	GENUINE SAVINGS
GNI PER CAPITA		
Pearson Correlation (r)	0.543*	0.824**
Sig. P (2-tailed)	0.016	0.000
N	19	19
HDI		
Pearson Correlation (r)	0.483*	0.806**
Sig. P (2-tailed)	0.036	0.000
N	19	19
POPULATION		
Pearson Correlation (r)	0.469*	0.790**
Sig. P (2-tailed)	0.043	0.000
N	19	19

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

TANZANIA

Economic indicators (figure 19a)

Both the indicators of Tanzania have a more or less steady growth with a 36% increase in her quality of life and a $700 more in their GNI per capita. Thus, the United Republic of Tanzania has the best quality of life among all the African LDCs of this study.

Sustainability Indicators (figure 19b)

The EF and biocapacity of Tanzania have more or less similar growth trends. Actually, in 1998, the country had an ecological reserve of 0.01 gha. However, Tanzanians could not reduce or maintain their demand for and consumption of natural resources and ecosystem services. This resulted in an ecological deficit of 0.20 gha in 2016. GS on the other side, has a significant increase shifting from 7.6 (1998) to 21.2 (2016).

Correlation of the variables

Though the country started with an ecological reserve, Tanzanians increased their EF, later on, causing the disparity between her demand for and consumption of natural capital and the supply of these capitals to rapidly enlarge. However, with high positive GS, the country's development is sustainable, though weakly. This makes Tanzania, the only country among the selected African countries, that is following a sustainable (though weak) development.

Figure 19a. Trends of GNI per cap and HDI in Tanzania

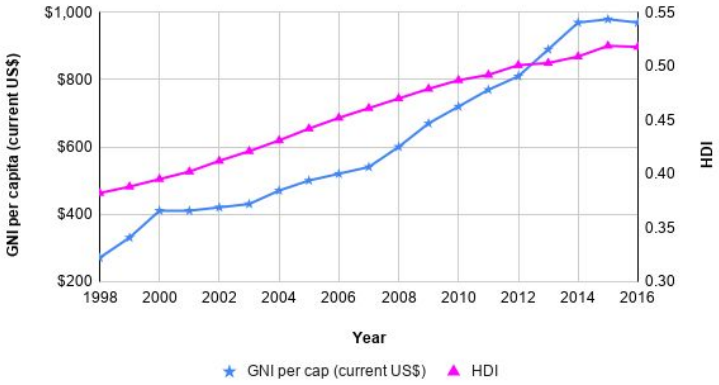
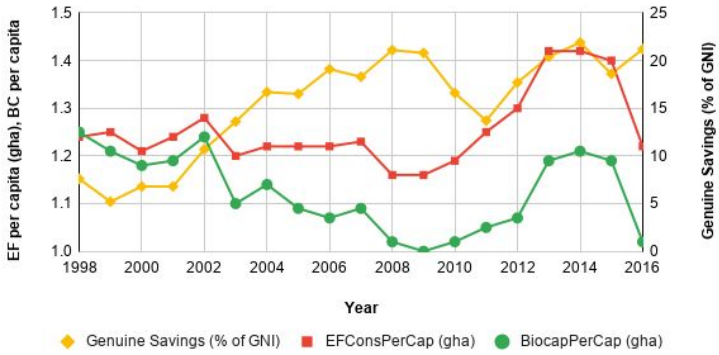


Figure 19b. Trends of Genuine Savings, Ecological Footprint & Biocapacity in Tanzania



Although weak, there is a significant correlation between GNI per person of the country and their EF (Figure 19c & table 19), the opposite is true for that of HDI and EF. Nonetheless, both indicators have a strong relationship between GS (figure 19c, 19d & table 19).

Figure 19c. Trends of the Correlation of GNI Per Capita vs Genuine Savings & Ecological Footprint in Tanzania

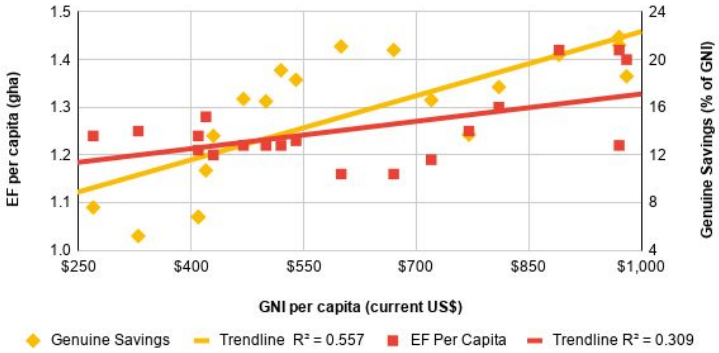
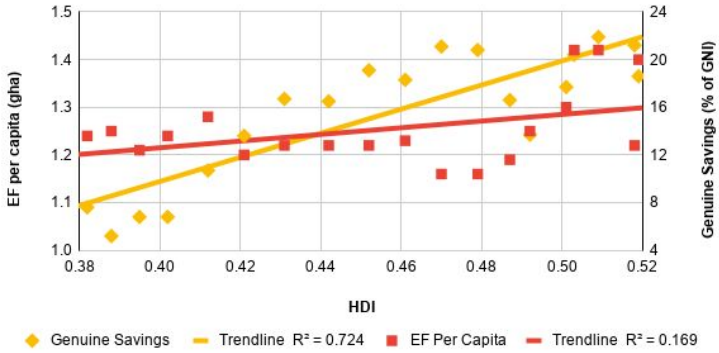


Figure 19d. Trends of the Correlation of HDI vs Genuine Savings & Ecological Footprint in Tanzania



Like all her fellow LDCs, Tanzania has a steady growth in its population, which shifted from 31.92 (1998) to 53.05 million people in 2016 (figure 19e). This remarkable growth correlates significantly with both EF and GS with 0.49 and R^2 of 0.63 respectively (figure 19e & table 19).

Figure 19e. Trends of the Correlation of Population vs Genuine Savings & Ecological Footprint in Tanzania

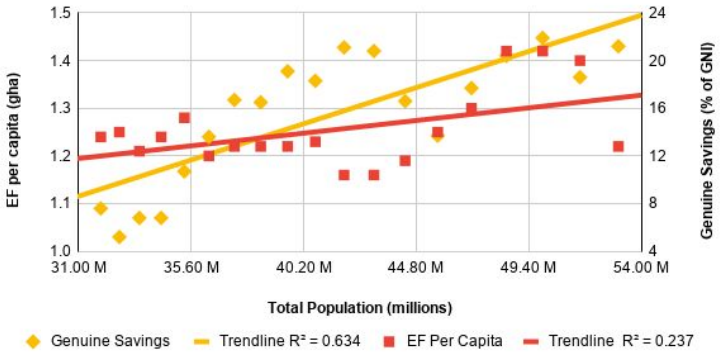


Table 19. CORRELATION OF THE VARIABLES IN TANZANIA

	ECOLOGICAL FOOTPRINT	GENUINE SAVINGS
GNI PER CAPITA		
Pearson Correlation (r)	0.556*	0.746**
Sig. P (2-tailed)	0.013	0.000
N	19	19
HDI		
Pearson Correlation (r)	0.411	0.851**
Sig. P (2-tailed)	0.080	0.000
N	19	19
POPULATION		
Pearson Correlation (r)	0.487*	0.796**
Sig. P (2-tailed)	0.034	0.000
N	19	19

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

UGANDA

Economic indicators (figure 20a)

Between the periods 1998 to 2004, Uganda had a decreasing trend in GNI per capita. This trend repeated again from 2010 onwards. The country's HDI on the other hand has a more steady growth shifting from 0.37 (1998) to 0.52 in 2016.

Sustainability Indicators (figure 20b)

There is a huge disparity between the EF and biocapacity in Uganda. This led to an ecological deficit of 0.71 in 1998. However, ever since, Ugandans have reduced their demand/or consumption of natural capital and thus reducing this deficit to 0.58 after 18 years. The country's GS, on the contrary, is unstable with an overall decrease of -7 in 2016.

Correlation of the variables

Ugandans EF far exceeds their available budget. Unfortunately, their GS does not only have an unstable trend but is also negative. Thus, Uganda's development is unsustainable.

There is a strong negative correlation between all the economic indicators with the EF of the country (figure 20c & 20d), all significant at a 0.01 level (table 20). However, although

significant, they both correlate weakly with GS with R^2 of 0.24 for GNI per capita and 0.22 for that of HDI and GS (figure 20c & 20d).

Figure 20a. Trends of GNI per cap and HDI in Uganda

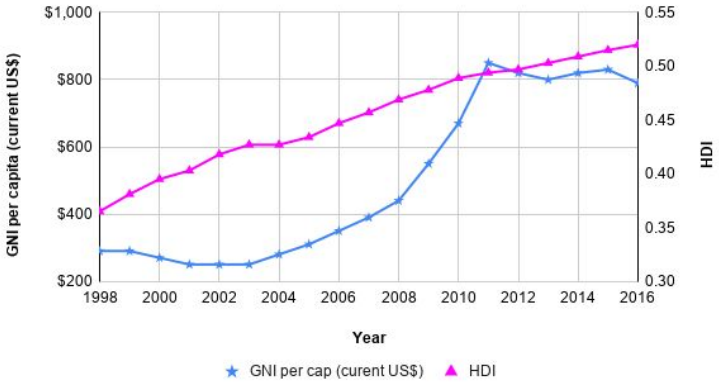
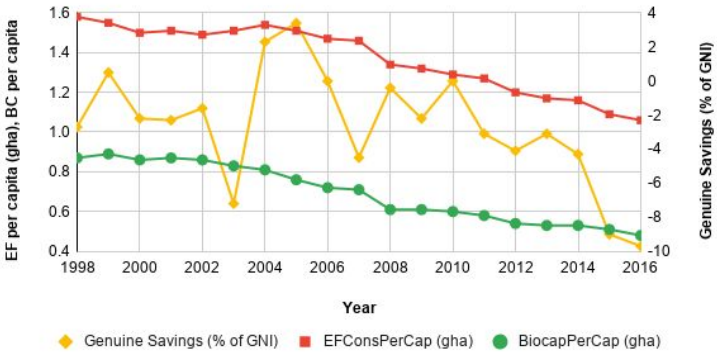


Figure 20b. Trends of Genuine Savings, Ecological Footprint & Biocapacity in Uganda



Uganda's population increased by 78% in 18 years (figure 20e). This growth has a negatively strong correlation with EF with a whopping R^2 of 0.94 (figure 20e). However, it only correlates by -0.54 with the country's GS (Table 20).

Figure 20c. Trends of the Correlation of GNI Per Capita vs Genuine Savings & Ecological Footprint in Uganda

Figure 20d. Trends of the Correlation of HDI vs Genuine Savings & Ecological Footprint in Uganda

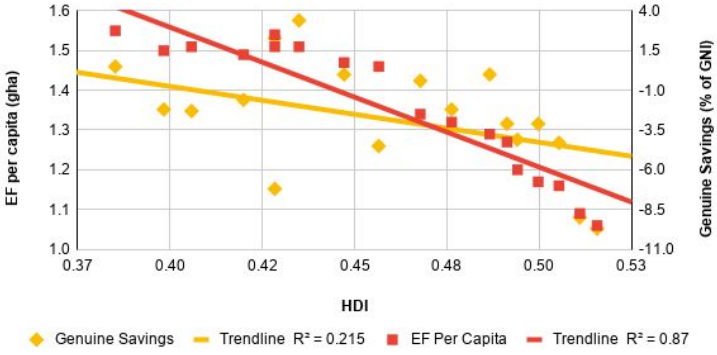


Figure 20e. Trends of the Correlation of Population vs Genuine Savings & Ecological Footprint in Uganda

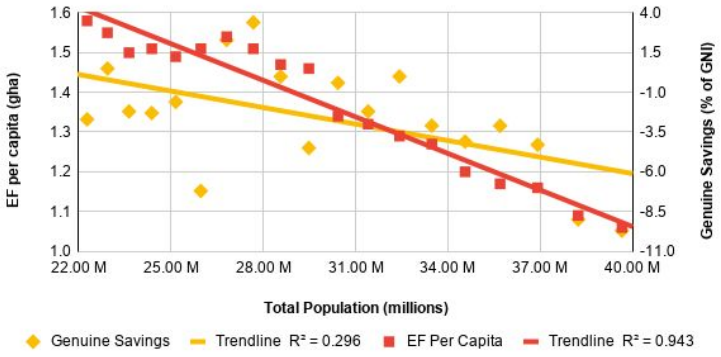


Table 20. CORRELATION OF THE VARIABLES IN UGANDA

	ECOLOGICAL FOOTPRINT	GENUINE SAVINGS
GNI PER CAPITA		
Pearson Correlation (r)	-0.946**	-0.493*
Sig. P (2-tailed)	0.000	0.032
N	19	19
HDI		
Pearson Correlation (r)	-0.933**	-0.463*
Sig. P (2-tailed)	0.000	0.046
N	19	19
POPULATION		
Pearson Correlation (r)	-0.971**	-0.544*
Sig. P (2-tailed)	0.000	0.016
N	19	19

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

Table B: Summary of the findings in the least developed countries

SN:	Country	Type of SD	Correlations					
			GNI vs EF	GNI vs GS	HDI vs EF	HDI vs GS	Pop vs EF	Pop vs GS
1.	Bangladesh	Weak	0.97**	0.77**	0.97**	0.90**	0.95**	0.93**
2.	Benin	Unsustainable	0.86**	0.29	0.88**	0.25	0.89**	0.19
3.	Burundi	Unsustainable	-0.86**	0.68**	-0.75**	0.59**	-0.79**	0.64**
4.	Cambodia	Weak	0.99**	0.63**	0.93**	0.68**	0.96**	0.70**
5.	Haiti	Weak	0.88**	-0.51*	0.87**	-0.37	0.85**	-0.40
6.	Malawi	Unsustainable	0.55*	-0.03	0.63**	-0.37	0.50*	-0.40
7.	Nepal	Weak	0.90**	0.94**	0.89**	0.96**	0.71**	0.92**
8.	Niger	Unsustainable	0.54*	0.82**	0.48*	0.81**	0.47*	0.79**
9.	Tanzania	Weak	0.56*	0.75**	0.41	0.85**	0.48*	0.80**
10.	Uganda	Unsustainable	-0.95**	-0.49*	-0.93**	-0.46*	-0.97**	-0.55*

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

CHAPTER 5: CONCLUSION AND DISCUSSION

After analyzing the findings of the study, this section will now draw the conclusion and discuss the findings. We will first start with the conclusion and followed by discussion.

5.1. CONCLUSION

The results of this study have provided a wide range of information on the nexus between population growth, economic condition, and sustainable development in general. In terms of the economic conditions, the developed countries for the most part have high and increasing trends in their GNI per capita and HDI. This development is accompanied by a gradual decrease in their demand for and consumption of natural resources and ecosystem services, while the area required to supply them this capital is also decreasing. Surprisingly, with the exception of Germany and Denmark, the rest of the developed countries have reduced their investments in human capital as shown in their genuine savings trendlines. Thus, in line with the thesis argument that *the economic condition of a country will influence the type of sustainability it follows;* hypotheses 1 *that GNI per capita will influence the ecological footprint of a country* and H2 that *HDI will influence the ecological footprint of a country,* we found a significant correlation between the economic condition of a country and its ecological footprint. Out of the 10 developed countries, our first and second hypotheses have been supported in 6 of the selected countries (Germany, Denmark, Canada, Australia, USA & Japan). An increase in the economic conditions (GNI per capita & HDI) of these countries, correlates negatively with a decrease in their ecological footprint. On that account, this supports our argument that *high economic conditions will result in less demand for and consumption of natural capital.*

The population in developed countries is not increasing at a rapid scale compared to LDCs. Poland for instance has a decreasing population, while Japan and Germany have less than 1% growth in their population. Nonetheless, with the exception of Sweden; Germany; Japan; and the Netherlands, there is a strong significant correlation between population growth and ecological footprint. However, all these correlations are negative except for Germany. That is, as their populations slowly increase, their demand for and consumption of natural capital gradually

decreases. Ergo, this supports our argument that g*rowth in population will only influence the type of sustainable development in the least developed countries* as population growth did not correlate to an 'increase' in the demand for and consumption of natural capital in all the selected developed countries. Hence, our hypothesis 4 has been accepted in all the selected developed countries. This result thus contradicts the argument and/or assumption that an increase in population will result in an increase in the consumption of natural resources (Barua & Khatania, 2015). Conversely, in line with our argument, wealthy countries (unlike poor countries) have the economic capability to invest in renewable resources and products which might reduce their dependence on natural capital. Poor countries, on the other hand, do not have the luxury to afford such. This might be the reason why an increase in their population did not correlate with an increase in their ecological footprint.

Moreover, among all the developed countries, only Canada, Australia, and Sweden are following strong sustainable development. However, the rest of the developed countries are on a path of weak sustainability. This result has therefore filled the gap in research about the missing element of developed countries in the literature of the relationship between their economic condition and sustainable development. As highlighted before, one possible explanation for this might be the fact that scholars assume that rich countries have already achieved development, therefore SD is meant for poor countries. Besides, since they are already developed, it will be logical to assume that they are following a strong sustainable development to preserve and/or protect nature and the environment. However, the result of this thesis contradicts this assumption as only three out of the 10 selected developed countries are following a strong sustainable development. Thus, the finding supports our argument that a country might be economically developed and yet still follows weak sustainable development.

Although increasing, the economic conditions in the LDCs are very low in actual value. For example, Malawi and Burundi have an increase of 70% and 80% respectively in their gross national income per person. However, in actual value, this is only an increase of $140 for Malawi and $120 for that of Burundi. Overall, all the selected LDCs have an increasing trend in

their economic conditions. However, unlike in developed countries, the sustainability indicators in LDCs have distinct directions. In general, the selected Asian countries all have an increasing trend in all their indicators. Most of the African LDCs on the other hand have an unstable growth in both their ecological footprint and genuine savings. An interesting observation is that some of the LDCs (Bangladesh, Haiti, Tanzania & Nepal) have higher genuine savings than most of the developed countries. An interesting, observation is that while all the Asian LDCs are notably increasing their investment in human capital (i.e., increasing genuine savings), with the exception of Tanzania, the African LDCs are unfortunately consuming their natural resources and ecosystem services with little or no counterbalancing investments in human capital. Although out of the scope of this study, the reason for this might be due to mismanagement of funds, incompetence, and corruption. This might explain why most of the Asian countries are rapidly graduating from the list of LDCs to becoming developing countries instead.

Nevertheless, we found a significant correlation between the GNI per capita of all the LDCs and their demand for and consumption of natural capital and thus, supports our first hypothesis. With the exception of Tanzania, the same is true for that of the relationship between HDI and ecological footprint; which also conforms to our second hypothesis. Similarly, with the exception of Uganda and Burundi, the economic conditions of all the selected LDCs correlate positively in contrast to a negative correlation in developed countries. This indicates that an increase in the economic conditions of LDCs correlates to an increase in their demand for and consumption of natural resources and ecosystem services. In other words, this result indicates that poor countries are demanding and consuming more of their natural capital than developed countries. Thence, whereas developed countries are reducing their dependence on natural capital, LDCs are increasing it. This supports our argument that low economic conditions will make countries consume more natural capital and vice versa.

The population in LDCs is growing faster than in many developed countries. Accordingly, we found a significantly strong correlation between the increase in the population of all the LDCs with their demand for and consumption of natural resources and ecosystem services. Therefore,

supporting our third hypothesis. Furthermore, just as we expected, the correlation between population growth and ecological footprint is positive in all the LDCs, except for Burundi and Uganda. Hence, this supports our argument that growth in population will lead to an increase in the demand for and consumption of natural resources only in the least developed countries as they lack the capability (economic) to sustain these growths through investing in renewable consumption.

In general, all the selected Asian LDCs in this study are following a weak sustainable development. Tanzania and Haiti also joined this category, making Tanzania the only African LDCs following a weak sustainable development. Though most of them have increasingly positive genuine savings trends, however, with an increasing demand for and consumption of natural resources and ecosystem services - unlike in developed countries - these countries are not moving towards a strong sustainable development. On the contrary, the development in five of the six selected African countries (Benin, Burundi, Malawi, Niger & Uganda) is unsustainable. With that being said, none of the LDCs are following a strong sustainable path. Thus, this result rejects our arguments that a country might be economically poor and yet still follows a strong sustainable development.

Another important new insight that this study found is the influence of geographical location. Prior to the analysis, we accentuated that we did a decent geographical spread amongst the continents to find out if this difference will be important. The results provided two findings in relation to this. For developed countries, geographical differences did not matter as they all have similar growth patterns in their indicators. Thus, the influence of geographical location is unfounded for the selected developed countries.

As for LDCs, there is a difference between the Asian and African countries. There is a similar pattern in all of the selected Asian LDCs, in that there is an increase in all their indicators and are all following the same type of SD. The African countries too (except Tanzania) are all following the same type of SD.

Based on both single countries and combined results, we found evidence supporting the existence of a correlation between population growth, the economic condition of a country, and the type of sustainable development they follow. We have seen that three of the developed countries are following strong sustainable development. In addition, the developed countries that are on a path of weak sustainability, are gradually moving towards a strong sustainable development. However, though they have a downward trend in their ecological footprint, it should be noted that despite the high economic conditions of developed countries, they are still demanding/consuming more natural capital in value than the LDCs.

On the other hand, the type of sustainable development in the least developed countries is weak sustainability and unsustainable development. Half of them are following weak sustainability and the other half are on a path of unsustainable development. However, it should be noted that the countries in the former category - unlike developed countries - are slowly moving towards an unsustainable development. Thus, if they should continue with their current development trends, they will soon join their counterparts in the unsustainable development category.

These results helped us provide the answer to our central question: *what extent population growth and the economic conditions of a country influence the type of sustainable development the country follows?* And our sub-questions below:

c. *To what extent population growth has an influence on the type of sustainable development selected countries follow?*
d. *To what extent economic conditions influence the type of sustainable development the country follows?*

Based on the results of this study population growth and the economic condition of a country influence the type of SD that a country follows. The extent of which is strong in some countries and very weak in others. As for population, it only influences the increase in demand and consumption of natural resources and ecosystem services in LDCs and not developed countries.

5.2. DISCUSSIONS

In this section, we will discuss the findings of this study in terms of the expectations and arguments accentuated in the development of the thesis. First, we will briefly discuss the findings, present the theoretical implications, and new insights; then we will look at the overall limitations of the study, and provide recommendations for further research.

5.2. DISCUSSION

We have made several choices (literature, indicators & methodology) and arguments in this study that obviously have consequences. To start with, we selected the above theoretical works as they provided us insights related to our central question. In specific the two main literature (Barua & Khataniar, 2015 and Bissoon, 2017) were selected as they were the only works that we could find that looked at the type of SD that countries follow and the nexus between economic conditions and type of SD. These studies gave us the opportunity to find a gap in the literature. While Barua & Khataniar (2015) were only interested in finding out the type of SD that the selected different economic level Asian countries were following, Bisson (2017) studied some factors that influence GS growth in SSA countries. We argued that there is a need to look into the extent to which economic conditions influence the type of SD a country follows, which was indeed a good choice. The results of this study summarized in tables A and B provide enough information to support and validate this argument. In general, we found strong and significant correlations between economic conditions and the type of SD in most of the selected countries. A new insight into the literature of SD which opened doors to many questions for further research.

Although there are various indicators of SD, we decided to choose GS and EF (reasons mentioned in Reliability & validity). This choice gave us the opportunity to see the interplay between the substitution of various capitals in our selected countries. For example, through GS, we were able to see that African LDCs are investing less in their human capital while the opposite is true for the Asian LDCs. It also gave us the opportunity to notice that almost all the developed countries are reducing their investments in this capital. An unexpected finding is that the Asian LDCs and Tanzania have higher GS values than all developed countries. A possible

explanation of which might be the fact that the developed countries have already invested enough into human capital (schools, roads, hospitals, etc) and hence have shifted their focus to some other priority areas.

We argued that looking into developed and LDCs will provide us more insights than comparing developed with emerging/developing economies. First of all, there has already been a study that looked into the type of SD in emerging economies (Barua & Khataniar, 2015), though they only limit it to Asia. Secondly, if we had compared developed and developing countries we might not have had the same results, as some countries listed under emerging economies (like Israel, Qatar) do have higher scores in their economic indicators than most developed countries.

Nonetheless, the lack of data available on all the units of our study has influenced our case selection and study period. Most of the LDCs do not have data from 1998 downwards and 2016 is the latest available data for ecological footprint for all the countries. This led us to narrow our study period to only 18 years. however, whereas the sample size of the study is a weakness, the study period on the other hand is enough to see trends, patterns, and extract findings. Thus, it did not influence our results as even if we had longer periods, the results would have been the same.

5.2.1. Theoretical implications & New Insights

The aim of this thesis is to discover the type of SD that the selected countries are following and find out to what extent this has been influenced by their economic conditions and population growth. The results gave us new insights into the burgeoning literature of SD and also contradicts previous research in some aspects.

Overall we found out that none of the developed countries is following an unsustainable development. 3 of them are following SS and the remaining 7 are gradually moving towards the same direction. As for LDCs, none of them is following SS. half of them are following WS and the development in the other half is unsustainable. Another new insight is that as the economic conditions of the selected developed countries are increasing, their demand for and consumption

of natural resources was decreasing. However, this decrease was not influenced by their economic conditions in all the countries, as indicated in table A.

That of population growth, the thesis contradicts previous studies. It was argued by scholars that an increase in the population of a country, would result in an increase in the consumption of natural resources (Barua & Khatania, 2015). However, we argued that *growth in population will only influence the type of sustainability in the least developed countries. That is, it will not result in an increase in the demand for and consumption of natural capital in developed countries and vice versa.* The results of this study supported this argument as we found negative correlations between population growth and ecological footprint in 9 out of the 10 selected developed countries. This means that, as developed countries' population was increasing, their demand for and consumption of natural resources was decreasing. The only exception to this was Germany. This is because Germany's population throughout the study period was more or less the same with only a 0.37% total increase. For that of LDCs, as indicated in table B, there is a positive correlation between population growth and EF in 8 of the LDCs.

Another main argument that this study made is the inclusion of developed countries in studying their type of SD, which was ignored in research. We relate this to the fact that scholars assumed since developed countries already achieved a high level of economic development, they will be following a strong SD. Thereby we argued a country might be economically developed and yet still follow WS and vice versa. The results supported this argument as 7 out of the 10 selected countries are following a weak SD, though they are gradually moving away from it.

The lack of these arguments and others would make people in general assume that there's no relationship between economic conditions and SD and that population growth leads to higher consumption in all countries despite their economic levels. Most importantly, we would not have found out that different economic conditions of countries lead them to follow a certain type of SD. Again, since we found out that population growth is not resulting in an increase in the EF of developed countries but only in LDCs. This then means that rather than population growth, the

economic condition of a country is what influences the type of SD that the selected countries follow. Ergo, if poor countries could also achieve high economic development, growth in their population will not affect their EF.

To sum, the main insights that we could generate from this study is that, population growth and the economic condition of a country influence the type of SD that a country follows. The extent of which is strong in some countries and very weak in others. As for population, it only influences the increase in demand and consumption of natural resources and ecosystem services in LDCs and not developed countries. Furthermore, the influence of geographical location is not present in developed countries.

5.2.2. Strengths and Weaknesses

In every research, there are some strengths and weaknesses. The main weakness of this design is the lack of generalisability of the results, thereby affecting the external validity of the study. This is due to 2 main reasons. First, the sample size of the study. There are a combined total of 83 developed and least developed countries in the world, of which we only studied 20. Secondly, our hypothesis was not accepted in all the selected cases. Therefore our results cannot apply to all the countries in these categories. We thus recommend further research that looks into all the countries under these categories to further establish these findings.

In addition, it should be noted that though there might be a relationship between population growth and economic conditions of a country, however, this was beyond the scope of this study and thus a recommendation for future research. Similarly, due to time constraints, we were only able to study the influence of these two variables separately. We reckon there is a need to study their combined effects.

Furthermore, there might be several other factors rather than economics and population, such as environmental awareness in the country, the governance system, technological development, donor groups, etc., that can explain why a country's development is related to a particular type of

sustainability. However, due to limited time constraints, this thesis was not able to conduct all that research in one study.

Withal, since we do not have the data for other SD indicators, we cannot confirm whether the use of those indicators would have yielded the same results. Thus we recommend further studies to conduct a similar study to find out if they will result in the same findings of this study.

The purpose of this study is to find a correlation between economic conditions and population growth with the type of SD of a country, which made us limit this study to only countries, instead of individuals or private entities. Since the relationship between economic conditions, population growth and the type of SD in countries is confirmed, then further studies should find out if the population size and budget of a municipality; the employee size and budget of a company; the income level and a number of people in a house; will influence the type of SD that they follow.

Since the economic conditions of countries differ we adopted a comparative case study design of countries that are most different which allowed us to see some discrepancies. One main advantage of this design is that it allowed us to see the difference in the sustainability indicators and the type of SD that the two categories are following. If we had chosen a different design, we would not be able to find this and will hence be buried in research.

Nevertheless, a main disadvantage of case study design is that of selection bias on the part of the researcher. Though there was no bias in the selection of LDCs, as they were all selected based on the availability of data, we admit that the study may be biased by the way in which some European countries were selected, which might have an influence on our findings. For example, if we had selected Finland instead of Denmark, we might have found out that the Scandanavian countries in the study are all following SS. Nonetheless, if we had not selected Denmark, we would not have also found out that some Scandinavian countries are not following SS. Therefore

this choice is a blessing in disguise. Thus, in order to find an established recurring trend, there is a need for further study that will look into all the countries.
The major limitation of this study is that the results, rather than causality, only confirm correlation. Therefore, an additional study is required to determine the causal effects of our three variables model.

As much as the study had many weaknesses, it does have many strengths too. Many of which have already been presented in the theoretical implication sub-section. For the most part, the choices made in this study have provided many new insights, that would not have been noticeable if we had not made those choices and arguments. Our design allowed us to gain new insights and unexpected findings that otherwise would not have been seen.

5.2.3. Recommendations and Practical Implications

Though we have already highlighted lots of recommendations for further research, this section presents the recommendations for the practical implications of the study. Firstly, while other authors are debating about which type of SD that countries should follow, we recommend that countries should conform to both the two types (WS & SS) and frameworks (GS & EF) of SD, as they are both necessary for them to achieve sustainability. We agree with WS because the depletion of some natural capitals (eg. uranium, natural gas, oil, etc) does not have severe consequences on future wellbeing, compared to other types of resources (eg., deforestation, biodiversity loss). What would be the effect of not consuming oil, natural gas while they have lots of benefits economically to the countries? Though it might lead to high emissions in these countries however this will make them financially able to invest in renewable resources that do not require the use of fossil fuel and eventually reduce their EF.

To sum, there are some resources that we can actually consume. However, the only way for this consumption to be sustainable is if we invest revenue into other forms of capital to provide basic human needs so that the overall well-being does not depreciate over time. At the same time, we should be preserving other forms of natural capital as their depletion does have serious negative

consequences on our environment in general and well-being in particular. Therefore the concept of both weak and strong sustainable development and the framework of genuine savings and ecological footprint are both a necessity for countries to achieve sustainability.

Hence, we recommend that since developed countries have already achieved a high level of economic development, their focus should now be on investing more into renewable energy and products, that do not involve the consumption or depletion of natural capital and also reduce the use of fossil fuels and carbon emissions into the atmosphere (eg., using electric vehicles, solar energy, etc). Since carbon emissions contribute more than 50% of the EF of developed countries (GFN, 2020). In addition, they should also encourage their citizens to use renewable energy products. While the focus of LDCs should be on accumulating this needed revenue so that they could invest in renewable energy and products. We could see that the Asian LDCs are pretty much on this track, while the African LDCs are not investing much into their human capital.

Since this study has now confirmed the relationship between economic conditions of a country and the type of SD that the country follows; whereas countries with high economic development tend to follow strong sustainability and countries with low economic conditions, tend to be on a path of unsustainable development. In other words, the economic condition of these countries is what is influencing why they are following unsustainability. Therefore, further research should find out the factors that can increase the economic conditions of a country, without an increase in their demand for and consumption of natural capital. If countries can find ways of doing this then they will also be following or moving towards a strong sustainable development.

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