SUSTAINABLE DEVELOPMENT IN GHANA; WITH OR WITHOUT AID?

To what extent is sustainable development still possible in Ghana if they were to become aid free in 2020?

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ABBREVIATIONS:

AfT	Aid for Trade programme
CESCR	Committee on Economic, Social and Cultural Rights
CO_2e	Carbon Dioxide equivalent
DDA	Doha Development Agenda
GEDAP	Ghana Energy Development and Access Project
GW	Gigawatt
GWh	Gigawatt hour
ICESCR	International Covenant on Economic, Social and Cultural Rights
kW	Kilowatt
kWh	Kilowatt hour
MDG	Millennium Development Goals
MW	Megawatt
NES	National Electricity Scheme
NGOs	Non-governmental Organisations
ODA	Official Development Assistance
OP-ICESCR	Optional Protocol to the International Covenant on Economic, Social and Cultural Rights
PDS	Private Sector Development
PPP	People, Planet and Profit
PPP	Public Private Partnership
PS4D	Private sector for development
PSinD	Private sector in development
RER	Renewable Energy Resources
SDGs	Sustainable Development Goals
UN	United Nations
UNGA	United Nations General Assembly
UNHCHR	United Nations Office of the High Commission for Human Rights
WTO	World Trade Organisation

1.INTRODUCTION

Ghana's economy has been growing over the last decades. This growth is led by Ghana's political stability, its relatively liberal economic policies, and its rising primary commodity prices. This growth resulted in a decrease in poverty in Ghana; extreme poverty declined from seventeen percent to eight percent between 2006 and 2013 (UNDP, 2015). Due to this economic growth and the decline in poverty, Ghana has been ranked as a lower middle income country, since 2011, instead of a lower income country (World Bank, 2017). This overall progress urged the Ghanaian Government and their development partners to strive for an "aid free" Ghana by 2020 (Embassy of the Kingdom of the Netherlands Accra, 2014). Considering aforementioned, the Dutch Minister for Foreign Trade and Development Cooperation, Lilianne Ploumen, recommended to the Dutch Government to gradually decrease their development aid to Ghana and eventually stop the development aid entirely, by 2020.

However, economic growth does not immediately imply sustainable development. Some scholars even state that economic growth cannot go together with securing social and environmental dimensions, which are important aspects of sustainable development (Schneider e.a., 2010). The concept of sustainable development has grown in fame since its big breakthrough in the scientific environment, because of the report 'Our Common Future' better known as the Brundtland Report from 1987. The concept, as defined in the Brundtland Report, had two main facets: the demands versus the offer of resources and short term development versus long term development. These facets were relatively abstract, but over the years they became more and more concrete and eventually specified into three dimensions: social, economic and environmental (Kuhlman & Farrington, 2010). As prescribed in the United Nations' agenda for development: "economic development, social development and environmental protection are interdependent and mutually reinforcing components of sustainable development." (United Nations, 1997, Annex 1). These components are often referred to as People, Planet, and Profit (PPP). The PPP are in equilibrium of importance in the concept of sustainable development and have to be connected, as illustrated in figure 1, in order obtain a sustainable development (Kuhlman & Farrington, 2010).

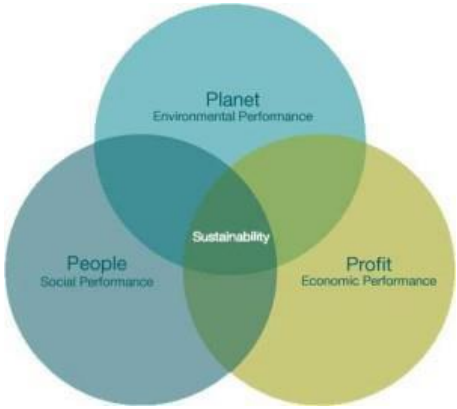

Figure 1: Traditional example of the three elements combined to obtain sustainable development (Happonomy, 2016).

Ensuring sustainable development is part of the Millennium Development Goals (MDGs). The MDGs emanated from the Millennium Declaration adopted by world leaders at the Millennium Summit of the United Nations in 2000. The Declaration captured the aspirations of the international community in terms of, among other things, ensuring environmental sustainability and developing a global partnership for development (UNDP 2015). Ghana is ranked 144 out of 188 countries in the Human Development Index, while the Netherlands is ranked seventh (UNDP, 2015). In September 2001, Ghana committed to the tenets of the MDGs. The Ghana Millennium Development Goals Report of 2015 shows Ghana managed to achieve several goals. However, only slow progress has been made by Ghana concerning MDG 7, which entails the goal to ensure environmental sustainability. More

specifically, MDG 7 focuses on the reversal of the loss of environmental resources, and the significant improvement in the lives of slum dwellers by 2020. Although some progress has been made concerning MDG 7, this progress can be contributed, among other things, to the WASH program (UNDP 2015).

To strive towards the fulfilment of MDG 7, the Netherlands and the Government of Ghana are working together on a multi-annual programme in Water, Sanitation & Hygiene (WASH). The Ghana Millennium Development Goals 2015 Report explicitly mentions the WASH program as one of the key factors contributing to the progress made to try and achieve MDG 7 (UNDP 2015). The WASH program established the Special Treat Project, which is a project in Ghana focussed on sustainable development. Their main goal is to: "improve the living conditions of 300,000 people in the Greater Accra region through improved and sustainable waste water management and treatment" (RVO 2017). Momentarily, due to the lack of sanitation facilities, the citizens of Ghana are living in a polluted environment which causes harm to their health. By means of this project, environmental pollution will be counteracted in order to achieve a more sustainable environment. Through a waste management system, production facilities for biogas, fertilizer will also be established (The Special Treat Project, 2016). The financial support for the Special Treat Project in Ghana is primarily provided by the Ghanaian Government and the Dutch Government. However, as mentioned, Ghana wishes to become aid-free by 2020. Considering this deadline, the Special Treat Project has to be self-sustaining by 2020, because the financial support from the Dutch Government will stop by then (Embassy of the Kingdom of the Netherlands Accra, 2014).

Thus, Ghana has been doing well over the past few decades, when focussing on their economic growth, and has the aspirations of becoming aid free in 2020. However, since environmental goals, such as MDG 7, have not been achieved in Ghana, the question is raised to what extent sustainable development is still possible if Ghana were to become aid free in 2020?

The insights of this research will be used as a policy advice on the sustainable development of Ghana to the Ghana Consultative Group. This group, consisting of the Government of Ghana and development partners, is working together on the Multi-Annual Strategic Plan of Ghana. This advice can be used to support or to reconsider the deadline of 2020.

INTEGRATIVE APPROACH

The complexity of this question gives way to the involvement of different disciplinary insights. Therefore, three different disciplines will give insights into this topic, in order to fully answer the research question. The different insights will be provided by Development Geography, Sustainable Energy Sciences and International Law.

Because of the involvement of different actors, one sole discipline cannot give satisfying insight. The involvement of the Government of Ghana, the Government of the Netherlands, the private sector, and the citizens of Ghana require different disciplines, to fully comprehend the role of these different actors. Whereas International Law can research the role of the Government of Ghana and the Government of the Netherlands, it cannot give insight into the role of the private sector. However, Development Geography can specifically research the role of private actors in Ghana while focussing on sustainable development. Secondly, the complexity of the question is found in the way sustainable development is described. Where Sustainable Energy Sciences can research to what extent Ghana is capable to move towards a more renewable based energy mix, International Law cannot. On the other hand, International Law lies the emphasis with the living conditions of the people in Ghana, which is also an important element of sustainable development. Furthermore, the relation between aid and development is something which can be researched within Development Geography. These arguments taken together, emphasise the necessity of multiple disciplinary insights.

Other disciplines which could give important insights into this topic are Economics and International Relations. Economics, considering the emphasis on the economic growth in Ghana. Furthermore, International Relations could give a greater insight into the bilateral relationship between Ghana and the Netherlands.

As mentioned, Sustainable Energy Sciences, International Law, and Development Geography, can give important insights into the possible necessity of aid when trying to realise sustainable development in Ghana. Thus, firstly, Sustainable Energy Sciences will research whether international aid has influenced the capacity of Ghana to move towards a more sustainable energy based system. Secondly, International Law will research international obligations to support Ghana in the achievement of sustainable development goals. Finally, Development Geography will research the role private actors can play, if the public sector no longer supports Ghana. These insights taken together can affirm or deny the necessity of the involvement of the public sector in Ghana in order to achieve sustainable development.

By researching these different components by means of aforementioned disciplines, different insights will be gained. These insights will be integrated, by means of the integration techniques developed by Allen F. Repko (2012). These integration techniques will allow for the creation of a common ground. The integration techniques are of the utmost importance, considering some assumptions and concepts within the different disciplines might differ. When the common ground has been created, consequently a more comprehensive understanding can be gained. This more comprehensive understanding will provide the newly found insights of this interdisciplinary research.

2. INTERNATIONAL SUPPORT, A NECESSITY FOR RENEWABLE ELECTRICITY PRODUCTION?

BACKGROUND

Ghana has a growing economy (Lin e.a., 2014), but economic development alone is not enough in order to achieve sustainable development (Kuhlman & Farrington, 2010). One of the possibilities to head towards sustainable development in the future is by making the transition towards a renewable energy based economy. Ghana has mainly a high potential in the production of electricity based on renewable energy resources (RER) (Lin e.a., 2014), but the realisation of this potential seems difficult for the low middle income country (Gyamfi, Modjinou & Djordjevic, 2015). Because of the increase in electricity consumption, a partly decentralised population, and problems with the maintenance of power plants, the Ghanaian Government had problems giving its population access to electricity (Kemausuor e.a., 2011). Since the country suffers many blackouts as well (Mahama, 2012) the production of electricity with RER is not the main priority. First the country wants to ensure electricity access for all its civilians. The plan of the Ghanaian Government was to give access to the electricity grid to all of Ghana in 2020 (Eshun & Amoako-Tuffour, 2016) through the national electrification scheme (NES), as initiated in 1989 (Kemausuor e.a., 2011). In 2016 only 72 percent of its population had access to the electricity grid. In the cities, the accessibility was relatively high but in rural areas only 50 percent of the population had access to the grid (WEO, 2016). This means that the Ghanaian Government has only a few years left to complete their task. Since over the last decades the electricity was increasingly produced with non-RER, it is assumable that the Ghanaian Government will not choose RER based electricity production in the nearby future.

Extra support could help as a stimulation to choose for a transition to RER based electricity production. The plan of the Ghana Consultative Group to stop the development aid in 2020 can have a large impact on this transition, since Ghana has many other problems as a developing country. The electricity industry is expected to grow rapidly in the nearby future and the current situation is not fully based on RER and Ghana (Kemausuor e.a., 2011). Electricity is only a small part of the energy mix in Ghana (Gyamfi, Modjinou & Djordjevic, 2015), but there is a lot of information available about this secondary energy. It also has a lot of potential to make a transition to renewables in comparison to most of the other secondary energy forms of Ghana (Lin e.a., 2014). Like many other nations Ghana has ratified the Paris 2015 Agreement to stop the further increase of the global temperature to a rise higher than two degrees Celsius (UNFCCC, 2016). A transition in the electricity sector would help Ghana to achieve a more sustainable development and to achieve their target to reduce the greenhouse gases by 15 percent in 2030 compared to 'business as usual' of 73.95MtCO_2e [1] (UNFCCC, 2015). This transition could be achieved with the help of international support.

During the last thirty years several large projects for the production of RER based electricity were initiated and most of the successful projects, like GEDAP and the construction of several hydropower energy installations, were subsidised and stimulated with international support (Mahama, 2012). Therefore international support could also be a key in the transition to a more RER based electricity production in the future. To find to what extent this international support can increase the renewable energy based electricity production in Ghana, the following question is looked at:

'To what extent is sustainable development in Ghana, focused on renewable energy based electricity production, be increased because of international support?'

[1] Carbon emissions are measured in tons of carbon equivalent (in this case million (Mega) tons).

To answer this question the main focus of the research is the production of electricity with the conventional forms of RER: solar energy, hydropower energy and wind power. These have the highest potentials for the production of electricity for Ghana (Gyamfi, Modjinou & Djordjevic, 2015). Bioenergy is not taken into account, because of the depletion of the main secondary energy, woodfuel, due to overconsumption in Ghana and since it is mainly used for heating and cooking instead of electricity production (Bensah & Brew-Hammond, 2010).

First the theoretical framework including theories and concepts about sustainability, RER, and the international support are highlighted. Then the increase in RER based electricity production is looked at between 1990 and 2015, to measure the period from start of NES to the current situation. This is followed by the role of the international support and the relation to the development in the use of RER. Finally the main research question is answered and analysed by discussing the results and concluding what the results means for Ghana's sustainable development and its dependence on international support, while taking in account the potential Ghana has to produce electricity based on RER.

THEORETICAL FRAMEWORK

In this chapter, the background information will be given in order to get a better understanding of the research and the possible outcomes. First the energy supply chain is explained for better understanding of the concept electricity. Then the current theories about RER are given and finally a short explanation is given about international support and why it was necessary for Ghana in the past.

ENERGY SUPPLY CHAIN

The energy supply system is the first part of the energy supply chain where the extraction and conversion of the primary energy resources take place. The second and final part of the energy chain is the energy demand system (Blok, 2009). In this part the energy from the primary resources is conversed into secondary resources and eventually distributed to economical usage. In figure 2 the energy supply chain is shown based on Blok's model (2009). Energy can be measured in several ways, but the secondary energy resource electricity usually is measured in Watts (W) for the capacity and Watthours (Wh) for the total electricity used in a certain period of time (Blok, 2009).

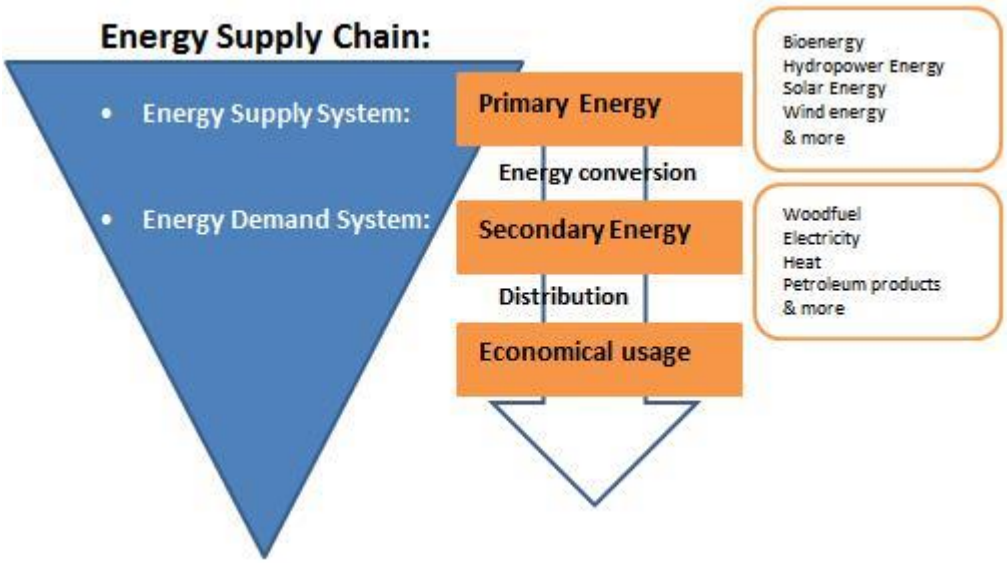

FIGURE 2: ENERGY SUPPLY CHAIN; THE PRIMARY ENERGY RESOURCES ARE CONVERSED TO SECONDARY ENERGY RESOURCES AND LATER DISTRIBUTED FOR ECONOMICAL USAGE (ENERGY COMMISSION, 2015).

RENEWABLE ENERGY RESOURCES

To achieve sustainable development secondary energy resources like electricity need to be available any time. This means they have to be available for the current generation and the future generations (Miller & Spoolman, 2012). Therefore, finite primary energy resources are not part of sustainable development, due to depletion. Appropriately used, renewable primary energy resources are available indefinitely and do not disrupt the ecosystems or human health when conversed into secondary resources and eventually economically consumed. Therefore, they do not disrupt a sustainable development (Kuhlman & Farrington, 2010). An energy resource is a renewable energy resource when it can be replenished by nature within a human lifetime (Miller & Spoolman, 2012). Renewable energy is not the same as sustainable energy, although both do not disturb the carbon cycle within the energy supply chain and both do not deplete the earth's resources when used in an appropriate way. RER is always a form of sustainable energy, but sustainable energy is not by definition renewable energy. For example, nuclear energy can be interpreted as a sustainable energy resource since it does not enhance the greenhouse effect, but it is not renewable and leads to other environmental problems (Miller & Spoolman, 2012). Sustainable energy is more abstract concept than the concept of renewable energy. All the commonly used forms of RER are shown in figure 3.

The most conventional forms of renewable energy are solar energy, wind power, hydropower energy, geothermal, and bioenergy since these are most commonly used in the world (Ellabban, Abu-Rub & Blaabjerg, 2014). Alternative methods are not implemented on a global scale yet (Miller & Spoolman, 2012). The conventional forms of RER all have different advantages and disadvantages, which mostly depends on the geographical location (Miller & Spoolman, 2012).

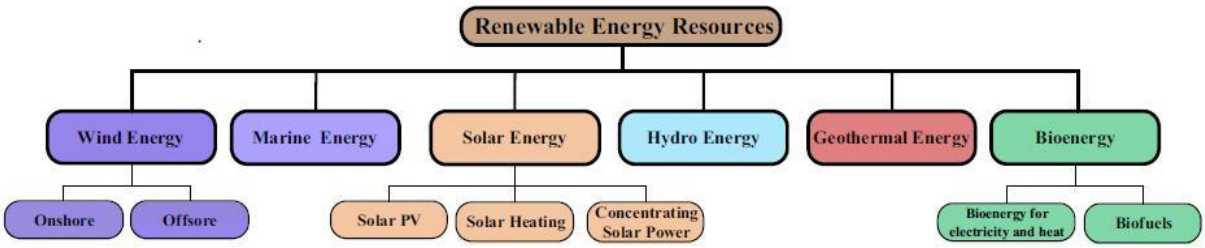

FIGURE 3: COMMONLY USED FORMS OF RENEWABLE ENERGY RESOURCES. (ELLABBAN, ABU-RUB & BLAABJERG, 2014).

INTERNATIONAL SUPPORT TO GHANA

International support can be given with many methods, but is mainly given with financial support. The support is given by different groups and can be divided in three groups; governments from other countries, nongovernmental organisations and companies (UNFCCC, 2015). In the past, Ghana started renewable energy projects. Some of these were more successful than others, but projects with international cooperation or aid were relatively successful by overcoming the internal struggles of Ghana (Mahama, 2012). There are several reasons for the dependency on international support in Ghana. First of all, the Ghanaian Government lacks the policy and legal framework to guide investments to support regional and national projects for renewable energy projects (Mahama, 2012). Secondly, Ghana is still largely depending on petroleum and its impact on the Ghanaian economy is significant (Lin e.a. 2014). Thirdly, since the 1990s there have been reforms in the energy sector to increase the private sector participation. Still, the companies tend to be conservative by "[…] introducing incremental improvements in the technology, products, and business models that gave them competitive advantage in the past […]". This mind-set does not lead to adaptation of new technologies and business models which are necessary to change the energy industry (Mahama,

2012, p. 77). The last and foremost reason for Ghana for the dependency on international support is the lack of financial resources to achieve the sustainability goals (UNFCCC, 2015).

METHOD

To find the answer to research question, a state-of-the-art review was executed to find the development in renewable energy based electricity production in Ghana and to give an insight on the potential of this renewable electricity production. Also, the dependency on international support to increase the electricity production was found. This dependency was measured with the amount of electricity produced with financial support from other nations and organisations, since this makes it measurable in a quantitative way.

Using articles, reports, and websites found with search engines like Google, Google scholar, ScienceDirect, and Web of science, the research could be done. In table 1, see appendix, the research categories and key words can be found which are necessary to find the corresponding data. The obtained data was used to give an overview of the conventional RER based electricity production of 1990 and 2014/2015. With this overview the growth of the conventional RER based electricity production was found. The obtained data also showed the influence of international support on the projects that made these RER based electricity production projects possible. With international influence in this sector and the growth in RER based production give an insight in the possibilities for a RER based electricity production in Ghana in the future. An overview is given in figure 4.

FIGURE 4: OVERVIEW OF THE DEVELOPMENT IN RER BASED ELECTRICITY PRODUCTION IN GHANA BETWEEN 1990 AND 2014/2015 AND FOR THE (NEARBY) FUTURE. FIRST ANIMATION REPRESENTS THE LACK OF

ELECTRICITY ACCESS IN 1990 (ECG, 2016), THE SECOND ANIMATION REPRESENTS THE ELECTRICITY MIX IN 2014/2015 (NOUN PROJECT, 2017), AND THE THIRD ANIMATION SHOWS A POTENTIAL FUTURE FOR GHANA (DEI, 2016).

RESULTS

This chapter shows the development of the electricity produced based on these conventional RER between 1990 and 2014/2015 and the influence of international support in obtaining the growth in RER based electricity production.

INCREASE IN RENEWABLE ENERGY BASED ELECTRICITY PRODUCTION IN GHANA

The largest increase in electricity production between 1990 and 2014 was the electricity produced with non-renewable energy sources (iea, 2017b), as shown in figure 5. The RER based electricity production did also increase as can be found in this section.

HYDROPOWER ENERGY

In 1990 the full generation capacity of hydropower energy was 935 MW in Ghana (Kemausuor e.a. 2011; iea, 2017a). In 2015 this was 1,580 MW (Energy Commission of Ghana, 2016), of which 1,420 MW was dependable capacity (Gyamfi, Modjinou & Djordjevic, 2015). This is an increase of 70 percent over 25 years. Although hydropower energy already is a major component in the renewable energy mix of Ghana it is not flawless. Full generation capacity cannot be reached due to lack of knowledge about maintenance and the low water inflows because of the lack of rainfall (Gyamfi, Modjinou & Djordjevic, 2015). In 1990 5721 GWh was produced and in 2014 8,378 GWh (iea, 2017b). Since in total 13,071 GWh was made available for the electricity grid in 2014, this was a large component of about 65 percent (IEA, 2015) as shown in figure 5. In 1990 this was 100 percent since Ghana did not produce electricity with non-renewable (iea, 2017b).

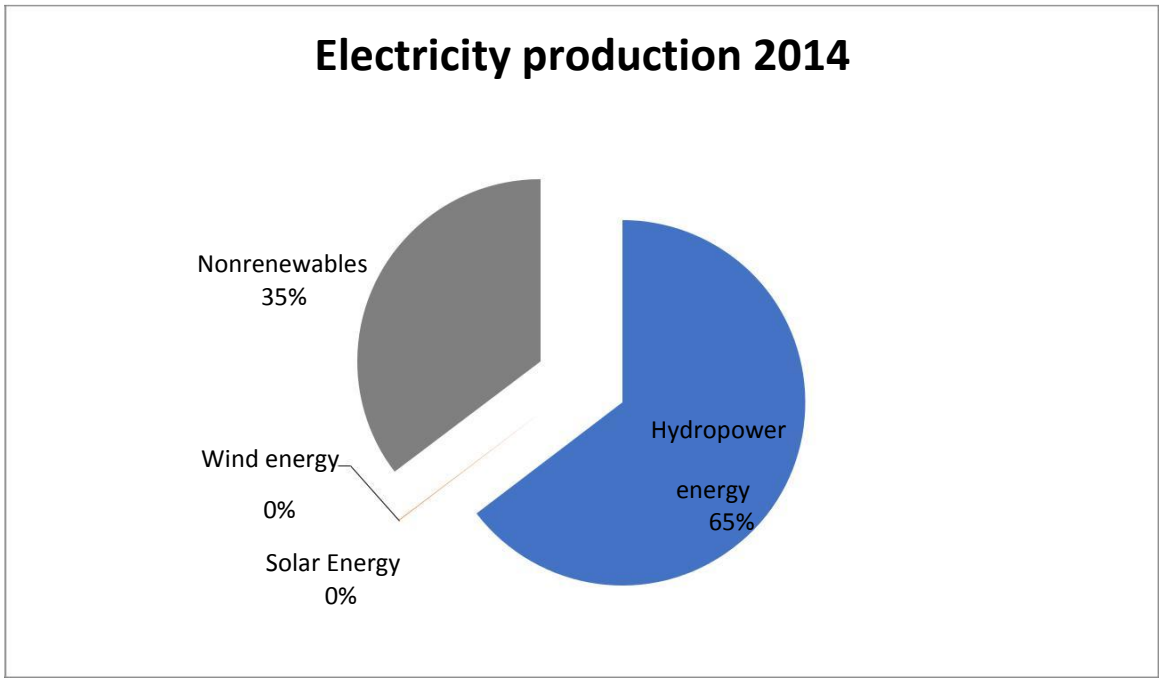

FIGURE 5: PIE CHART OF THE ELECTRICITY PRODUCTION FOR THE GRID IN GHANA IN 2014.

WIND ENERGY

The production of electricity from wind energy has not yet started in Ghana. Plans have been made to open wind energy farms in the nearby future, but they will not yet play a significant part in the energy supply chain of Ghana any time soon (iea, 2017b; RVO, 2016).

SOLAR ENERGY

The installation of solar energy systems started with the initiation of the NES in 1990 (Kemausuor e.a., 2011). Solar energy is at the moment only a small component of the energy mix of Ghana with a capacity of 22.5 MW, which is less than a percent of the capacity of the total electricity supply of Ghana, which was 3,656 MW (Energy Commission of Ghana, 2016). In 2014 the total production was 4 GWh (iea, 2017b). The production electricity based on the conventional RER is also shown in table 2 and figure 6.

Primary renewable energy resource	Installed capacity in 1990 (MW)	Installed capacity in 2015 (MW)	Total electricity production in 1990 (GWh)	Total electricity production in 2014 (GWh)
Hydropower energy	935	1,580	5,721	8,378
Wind energy	0	0	0	0
Solar energy	0.16	22.5	0	4

TABLE 2: INSTALLED CAPACITY OF ELECTRICITY AND TOTAL ELECTRICITY PRODUCED IN 1990 AND 2015 BASED ON PRIMARY RENEWABLE ENERGY RESOURCES.

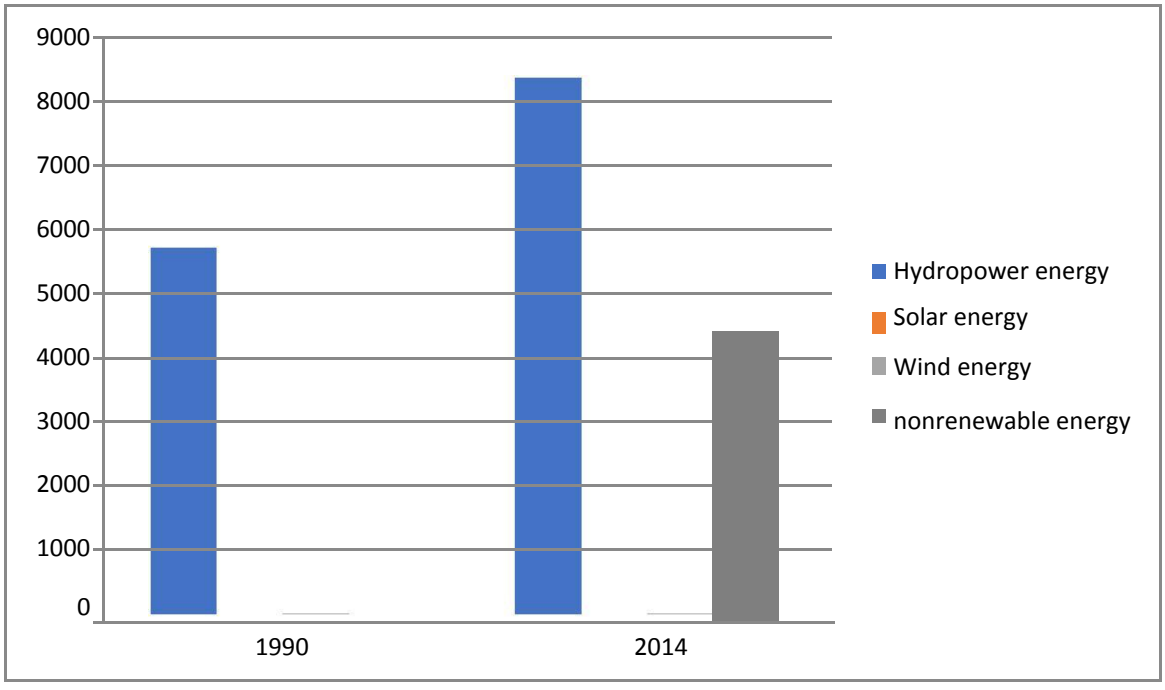

FIGURE 6: DIAGRAM OF THE ELECTRICITY PRODUCTION (GWH) IN GHANA IN 1990 AND IN 2014.

RENEWABLE ENERGY PROJECTS

The last decades since the NES, the percentage of people that had access to electricity was doubled from 35 percent to 72 percent (Mahama, 2012). The NES could be successful because of other projects that were stimulated by the NES. Some of these projects mainly focused on renewable energy production. The main project to obtain electricity access for all Ghanaians with renewable energy was the Ghana Energy Development and Access Project (GEDAP) in 2005 (Mahama, 2012).

GEDAP AND OTHER PROJECTS FINANCED WITH INTERNATIONAL SUPPORT

GEDAP is a project initiated by the Ghanaian government "to accelerate the access to electricity in urban and peri-urban areas, strengthen the power sector management capacity, and introduce innovations in technology […]" (Mahama, 2012, p. 78). The electrification of the population was done by using solar energy to provide electricity to 10,000 households and by an increase in the connections to the electricity grid. GEDAP was realised and funded by a large number of international financial institutions. Not only the access to the electricity grid was a necessity within this project, but also giving constant and stable access to the electricity grid. This was initiated in order to stop the many blackouts Ghana struggles with (Mahama, 2012).

Other projects in Ghana are not always directly initiated because of the NES, but can lead to an increase in accessibility of the electrification grid of Ghana with RER, as well. One of these projects is 'The Special Treat Project', initiated by WASH. Although the goal of this project is to manage and reduce waste, the secondary goal is to use that waste as a bioenergy and produce electricity to the population of Ghana. (RVO, 2015; MDF, 2016). In this way smaller projects with diverse motivations and targets lead to the goal NES set by the use of renewable energy. Like GEDAP The Special Treat Project largely funded with international support, namely the Dutch Government (RVO, 2015) The lack of financial resources made it impossible for Ghana to finance these projects themselves (UNFCCC, 2015).

China-Ghana-UNDP Trilateral is another example of how international support stimulates Ghana to achieve sustainable development. Financed by Denmark and with technology support of China, the goal of this triple country cooperation project is to reduce poverty through employment generation within the electricity sector. By increasing the off-grid community-based electricity access based on renewable energy the project aims to support socio-economic and environmental objectives (UNDP, 2017).

The World Bank has supported almost all major hydropower energy projects, and therefore stimulated almost all the RER based production (Eshun & Amoako-Tuffour, 2016). In figure 7 a diagram of the amount of hydropower based electricity production capacity is supported by the World Bank.

The World Bank also used to stimulate non-renewable electricity production in order to increase the accessibility to the electricity grid for the Ghanaian population, but now the organisation is stimulating the private sector to invest in the RER based electricity production. This way the organisation tries to make it less interesting for the Ghanaian government to stop subsidising non-renewable based electricity production (Eshun & Amoako-Tuffour, 2016).

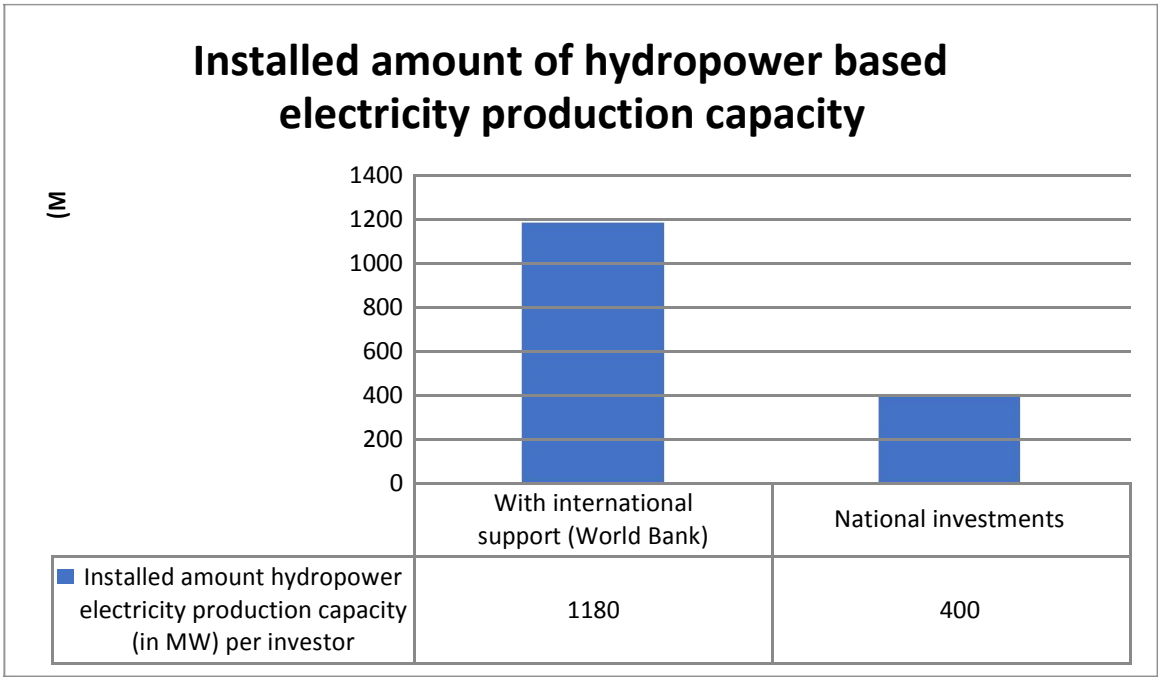

FIGURE 7: INSTALLED AMOUNT OF ELECTRICITY PRODUCTION CAPACITY OF HYDROPOWER PLANTS (MW) BY DIFFERENT FINANCIAL SUPPORTERS.

DISCUSSION

This research gave insight in the influence of international support for sustainable development, focused on renewable electricity production in Ghana between 1990 and 2015. Almost all major projects within this sector had been financially supported by the international community. The research did not give all the components to achieve sustainable development in the future, since produced electricity based on RER is only a small facet of sustainable development and it only looked at the production of electricity while also storage is necessary and different forms of energy like heat. It therefore should be taken in consideration that more is needed to achieve a sustainable development. Also, the research was focusing on the NES, while electricity is not the only consumed secondary energy form in Ghana and other main components like transport have not been taken into account. These do also cause Ghana to emit great amounts of carbon dioxide equivalents. It does show the large impact the international support has had on the increase in RER based electricity in the country. This way Ghana could head more in the direction of sustainable development than without the support.

FUTURE POSSIBILITIES

In the past international support has helped Ghana to achieve sustainable development by increasing RER based electricity production. Still a large part of the electricity production is based on non-renewable. For sustainable development, the electricity should fully be produced with RER. In this chapter, the potentials of the RER based electricity production of Ghana are shown.

HYDROPOWER ENERGY

Hydropower energy is a relatively advanced form of renewable energy in Ghana, but has still some obtainable potential. There are about 70 potential feasible hydro sites. These hydro sites have a

cumulative capacity potential of 800 MW (Gyamfi, Modjinou & Djordjevic, 2015). This could add 4500 GWh to the electricity grid.

WIND ENERGY

Wind energy capacity could have a potential up to around 2.0 to 5.5 GW depending on the actual wind speed. These potentials can only be obtained if the wind turbines would meet the necessary requirements. These requirements are suitable geographical locations (about 450 km^2) and the right altitude of the of wind turbines (about 50 meters) (Gyamfi, Modjinou & Djordjevic, 2015). It is relatively hard to predict the amount of electricity these wind turbines can produce, since the capacity factor is not known yet. An average capacity factor for wind turbines is around 30 percent (McKay, 2009). This would mean a yearly production between 5250 GWh (2.0 GW) and 14400 GWh (5.5 GW).

SOLAR ENERGY

Ghana's geographical location in the tropics also makes that solar radiation is available almost all year. On many parts of the Ghanaian surface the solar radiation is available and generates a potential average capacity of 1 kW/m^2 for 5-8 hours a day (Gyamfi, Modjinou & Djordjevic, 2015) which is about 1800-3000 sun hours per year in Ghana (Kemausuor e.a., 2011). On average this could lead to 5 kWh $/m^2$ / day with solar PV installations (Gyamfi, Modjinou & Djordjevic, 2015). As visible in figure 8, see appendix, there is not much difference in geographical locations where solar energy could be extracted. Therefor the total capacity and production potential fully depend on the amount of installations placed.

Primary renewable energy resource	Electricity capacity potential increase (MW)	Potential electricity production increase (GWh)
Hydropower energy	800	4,500
Wind energy	2.0-5.5	5,250-14,400
Solar energy	0,001/m^2	5/km^2/day

TABLE 3: POTENTIAL FOR THE CAPACITY OF ELECTRICITY AND TOTAL ELECTRICITY PRODUCED BASED ON PRIMARY RENEWABLE ENERGY RESOURCES.

ELECTRICITY TO ALL OF GHANA

In total Ghana has a potential to produce almost 13000 GWh of electricity a year with hydropower energy, 5250-14400 GWh a wear from wind energy, and 5 GWh/km^2/day from solar energy. In 2016, it is expected that the electricity requirements for Ghana will be at most 18500 GWh (Energy Commission, 2015). It seems that the potentials in these renewables could easily exceed this required amount if made operable in time. Although the economic situation in Ghana is improving, mainly solar energy and wind energy have to develop so greatly that this might be a costly investment and international support could help to finance the realisation of this potential. Future research about the

cost for the realisation of these potentials could give a further insight in the dependence of Ghana on the international support.

CONCLUSION

In order to achieve sustainable development, Ghana has still a lot to improve. One of these improvements would be the transition towards a more renewable based electricity production. In the last decades international support has helped Ghana to achieve sustainable development partly by stimulating almost 75 percent of the major renewable electricity projects. It can even be stated that the projects and NES itself will not have succeeded without international support due to the lack of thoroughness of the Ghanaian Government and the high cost. With potentials over 20,000 GWh, the internationally supported RER based electricity production projects show that Ghana is able to achieve an important component of sustainable development. Given this and together with the struggles Ghana has to independently achieve sustainable development, show that international support can increase the sustainable development in Ghana immensely with the stimulation of the electricity sector. With international support Ghana can achieve its targets to give access to electricity to its population in 2020, while reducing their greenhouse gas emissions. Since one major issue of sustainable development is the global climate change, other countries, companies and nongovernmental organisations should not stop supporting Ghana from 2020. Ghana is a low middle income country and does not have the resources, skills or urge to follow a path in the direction of a sustainable future. Because of the success of the internationally supported projects and the problem of global climate it can be concluded that it is a necessity to stimulate Ghana to a RER based electricity production. Future research could be necessary to find to what extent international support is necessary to realise the transition to a RER based electricity production.

APPENDIX:

Category	*Information*	*Keywords*	*Type of data*
Electricity capacity and production in Ghana	Information about the electricity capacity of Ghana in 1989	Ghana, electricity, capacity, hydropower energy	Governmental websites, Consultancy reports Consultancy websites
Electricity capacity and production in Ghana	Information about the electricity capacity of Ghana in 2014 and 2015	Ghana, electricity, capacity, hydropower energy	Scientific articles Consultancy file
Electricity capacity and production in Ghana	Information about the electricity production of Ghana in 1990	Ghana, electricity, production, hydropower energy	Scientific articles
Electricity capacity and production in Ghana	Information about the electricity production of Ghana in 2014	Ghana, electricity, production, hydropower energy	Scientific articles
Sustainable development and renewable energy	General information about the concept of sustainable development	Sustainability, sustainable development, renewable energy	Scientific articles, scientific boos Governmental files
Sustainable development and renewable energy	General information about renewable energy and the difference between renewable and sustainable energy	Sustainability, sustainable development, renewable energy	Governmental website, Consultancy files, Scientific articles
International support and projects in Ghana	General information about international support	United Nations, UN. Ghana. Sustainable development	Scientific articles
International support and projects in Ghana	Information about the different projects that support Ghana towards a sustainable development	RVO, Ghana, electricity access,	Governmental website, Consultancy files, Scientific articles

TABLE 1: CATEGORIES, GENERAL INFORMATION, KEYWORDS AND TYPE OF DATA TO FIND THE NECESSARY INFORMATION TO PERFORM THIS RESEARCH.

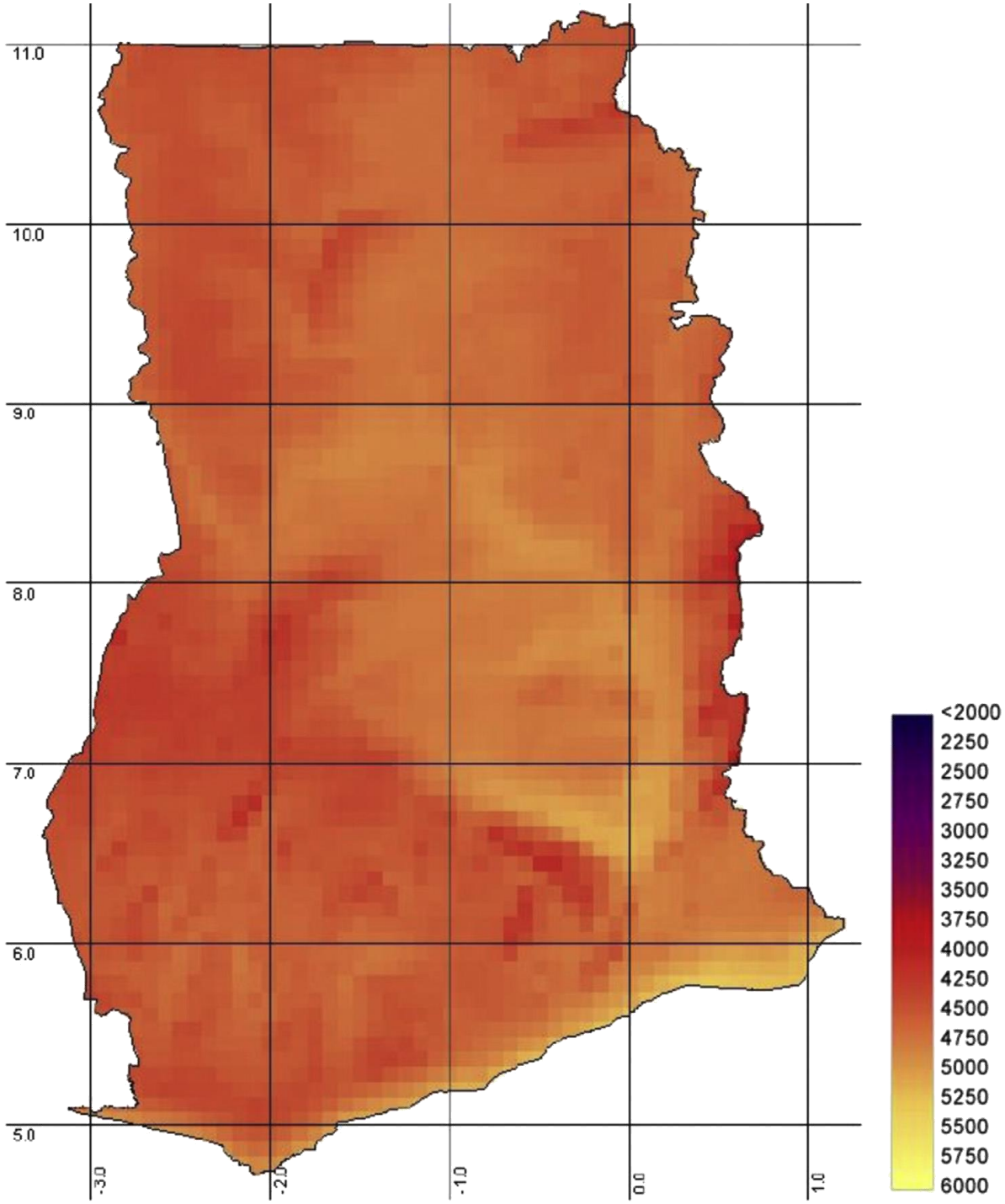

FIGURE 8: GHANA'S ANNUAL AVERAGE TOTAL DAILY SUM OF WH/M^2/DAY (GYAMFI, MODJINOU & DJORDJEVIC, 2015).

3. A RIGHT TO A CLEAN AND HEALTHY ENVIRONMENT?

EXTRATERRITORIAL OBLIGATIONS WITHIN INTERNATIONAL LAW

INTRODUCTION

Environmental protection is one of the concepts mentioned by the United Nations within their official interpretation of sustainable development (United Nations, 1997, Annex 1). An important element of such an environmental protection is for human being to be able to live in a healthy environment, which does not harm them (Orji, 2012). More specifically: "human beings are at the centre of concerns for sustainable development" (Rio Declaration 1992). Momentarily, the citizens of Ghana are living in a polluted environment, which causes harm to their health. This does not coincide with international objectives for the living conditions of human beings. As mentioned, Millennium Development Goal 7 (MDG 7) entails the goal to ensure environmental sustainability, which includes human health and well-being (UNDP, 2015). In the Ghana Millennium Development Goals 2015 Report, it has been shown that Ghana has not yet reached this goal. However, this report also shows how programs, such as the WASH program, are one of the key factors contributing to the progress made concerning MDG 7 (UNDP 2015). As mentioned, the Special Treat Project, as part of the WASH program, counteracts environmental pollution.

Considering the focus on the aforementioned Special Treat Project, no attention will be paid to the possible harm caused by public or private actors. Whereas environmental pollution could occur as a result of the actions of public or private actors, in this case it does not. Thus, instead the focus will lie with the inability of the people in Ghana to counteract the pollution, which causes harm to their health. This raises the question whether international obligations exist to counteract this environmental pollution. Thus, considering the dire circumstances of the local citizens in Ghana it is important to research whether the Netherlands is obliged to protect these people; to what extent should the Netherlands ensure that the citizens in Ghana are able to enjoy a clean and healthy environment?

Since it is implied human beings are at the centre of concern for sustainable development, a human rights-based approach to establish obligations for the Netherlands will be used. Such a human rights-based approach recognizes legal obligations of States parties to human rights treaties (Hamm, 2001). However, within international treaties the human right to enjoy a clean and healthy environment is not explicitly described. This presupposes that states do not have an obligation to ensure a clean environment towards its people. Consequently, it is important to question whether a human right to a clean environment can be derived from a human being's dependence on a clean environment (Slob & Schilte, 2014). According to dr. Uchenna Jerome Orji the right to a clean environment can in fact be derived from human rights: "it can be said that the purpose of the right [to a clean and healthy environment] derives from the very fact that human beings are entitled to live in an ecological environment that does not constitute a threat to their lives" (Orji 2012:285). Orji explains this as an anthropocentric approach, which constitutes as a human-rights based approach, from which international obligations can incur. However, this requires a legal ground from which the right to a clean environment can be derived. Consequently, international obligations can incur for the international community.

In order to research the specific obligations required to ensure the people in Ghana are able to live in a clean and healthy environment, the typology of obligations will be applied. Furthermore, to research whether the Netherlands incurs obligations, firstly the principle of subsidiarity will be employed and secondly the concept of extraterritorial obligations will be put forward. Such

extraterritorial obligations could lead to an obligation for the Netherlands to continue supporting Ghana.

HUMAN RIGHT TO A CLEAN ENVIRONMENT WITHIN THE UNITED NATIONS

Ghana and the Netherlands are both members of the United Nations (UN), which entails that the rights present in the Charter of the United Nations must be realised in Ghana and the Netherlands. However, the Charter does not specifically mention any rights concerning the environment or sustainable development. Although the Charter seems to be lacking in this area, the UN has other means which are considering environmental issues (Dag Hammarskjöld Library, 2017). For instance, in 1972 the General Assembly (UNGA) recognised that: "man has the fundamental right to freedom, equality and adequate conditions of life, in an environment of a quality that permits a life of dignity and well-being" (Stockholm Declaration, 1972). The importance of an ecological environment which does not harm the life of human beings is hereby confirmed. Furthermore, in 1990 the UNGA explicitly mentions the importance of a: "healthy environment for the well-being of individuals" (Resolution 45/94, 1990). The UNGA goes even further in 1992 by putting human beings at the centre of concern, regarding sustainable development (Rio Declaration, 1992). Aforementioned shows that the UN puts great emphasis on the importance of a clean environment. However, for obligations to incur, a legally binding treaty has to establish the right to a clean and healthy environment.

The International Covenant on Economic, Social and Cultural Rights (ICESCR) went into force in 1976. This international treaty of the United Nations was adopted by the UNGA. Ghana ratified the ICESCR in 2000 and the Netherlands ratified in 1978, by which the provisions present in the ICESCR became binding for both countries. Article 12 of the ICSCR stipulates: "the right of everyone to the enjoyment of the highest attainable standard of physical and mental health". Furthermore, it specifies the importance of "the improvement of all aspects of environmental and industrial hygiene" (ICESCR article 12). Within international law, general comments are used to elaborate on rights put forward in international treaties and to show how these rights can be interpreted. The Committee on Economic, Social and Cultural Rights (CESCR) explains in their general comment no. 14 paragraph 11 how article 12 of the ICESCR can be interpreted:

> "The drafting history and the express wording of article 12.2 acknowledge that the right to health embraces a wide range of socio-economic factors that promote conditions in which people can lead a healthy life, and extends to the underlying determinants of health, such as […] a healthy environment."

The CESCR uses a teleological interpretation[2] by stating the drafting history of article 12 acknowledges a right to a healthy environment. Thus, the right to health is interpreted in such a way that it includes the right to a healthy environment. The CESCR elaborates on this even further by stating that article 12 of the ICESCR requires: "the prevention and reduction of the population's exposure to […] detrimental environmental conditions that directly or indirectly impact upon human health" (general comment No. 14 para 15). Within international law this interpretation of the right to health, as the right to a clean environment, has been recognized increasingly. For example, there are 140 constitution than mention explicit references to environmental rights (Riedel, Giacca e.a., 2014). Furthermore, it has been recognised by an independent expert of the UN Office of the High Commission for Human Rights (UNHCHR, 2013) Consequently, the right to the highest attainable standard of health, as articulated in article 12 of the ICESCR, encompasses the right to a healthy and

[2] Interpretation of treaties in light of the article's object and purpose; also known as purposivism.

clean environment (Bantekas & Oette, 2013). Thus, citizens of States parties to the ICESCR should be able to enjoy a healthy and clean environment.

In light of aforementioned findings, a right to a clean environment is established within international law, on account of article 12 ICESCR. Consequently, the citizens of Ghana, which is a States party to the ICESCR, should be able to enjoy the right to a healthy and clean environment. However, the circumstances of the people in Ghana do not coincide with the level of protection needed to speak of a clean environment. Therefore, obligations to ensure this right to a clean environment have to be researched.

OBLIGATIONS WITHIN INTERNATIONAL LAW

States parties to the International Covenant of Economic, Social and Cultural Rights incur obligations. To fully comprehend such obligations, the tripartite typology approach concerning international obligations has been developed within the academic debate on human rights (Coomans, 2007). This typology of obligations consists of the obligation to respect, the obligation to protect and the obligation to fulfil. General comment no. 14 of the CESCR explains that article 12 of the ICESCR, which encompasses the right to a clean environment, imposes all three levels of obligations on States parties. The obligation to respect requires States parties to refrain from directly or indirectly interfering with the enjoyment of the right to health (general comment No. 14 para 33). However, the obligation to protect requires measurements taken by States parties to prevent third parties to interfere with the right to health. Finally, the obligation to fulfil requires: "appropriate legislative, administrative, budgetary, judicial, promotional and other measures towards the full realization of the right to health" (general comment No. 14 para 33). Thus, the CESCR has given three different types of obligations, concerning the right to enjoy a healthy and clean environment.

The living conditions of the people in Ghana require an obligation to fulfil, when focusing on the area of the Special Treat Project. The circumstances the citizens are living in are not caused by state interference, neither are they caused by private actors. Thus, the circumstances occur due to a lack of resources available to counteract the pollution which causes harm to the health of the citizens. As described by the CESCR: "violations of the obligation to fulfil occur through the failure of States parties to take all necessary steps to ensure the realization of the right to health" (general comment No. 14 para 52). Consequently, measures have to be taken to ensure the full realisation of the right to a clean environment. This raises the question: who is the duty bearer of the obligation to fulfil the right to a clean environment within Ghana?

TERRITORIAL OBLIGATIONS WITHIN INTERNATIONAL LAW

Within international law, a distinction exists between territorial obligations and extraterritorial obligations when discussing duty bearers. Due to the principle of subsidiarity Ghana is the first responsible actor to incur obligations towards the realisation of the right to a clean environment. A division of responsibility is drawn between the domestic state and the foreign state. This division exists out of two principles: (1) the primary responsible for the realisation of ESC rights lies with the domestic state and (2) the responsibility of the foreign state is complementary, also known as subsidiary (Vandenhole & Benedek, 2013). Thus, the primary obligations concerning the realisation of human rights rest with the domestic state, but foreign states also carry a duty concerning the realisation of human rights. When speaking of the latter, domestic states have an obligation to seek assistance and cooperation when unable to realise human rights themselves (Karimova 2014). This would result in an extraterritorial obligation.

In 2011 the Ghanaian Government specifically called upon the developed countries to provide financial, technical and other forms of assistance to counteract waste pollution. During the 19th session of the Commission on Sustainable Development, the head of the delegation of Ghana stated

that environmental protection in this area should be a priority concern (Kuuzegh, 2011). Since 1998 Ghana has been cooperating with the Netherlands concerning development assistance (Rijksoverheid 2017). The Special Treat Project is a means to counteract the waste pollution, through the Netherlands' development assistance. However, while in 2011 the Ghanaian Government requested assistance to realise environmental protection, by 2014 they proclaimed to be able to realise this on their own by 2020. This raises the question whether Ghana can ensure the right to a clean environment towards its people, without aid. Does Ghana have the capacity to fulfil the right to a clean environment to their citizens? When focusing on the current situation in Ghana, one should be hesitant to positively affirm this question. Furthermore, in 2010 the Government of Ghana and its developing partners fully committed to realising the Millennium Development Goals (MDG's) by 2015 (UNDP 2011). However, in the report published in 2015, it became known that Ghana was unable to realise these MDG's by 2015. More specifically, MDG 7, which is the goal to ensure environmental sustainability, and includes the importance of human health and well-being, was not yet realised in 2015 (UNDP, 2015). Consequently, one should look at extraterritorial obligations to ensure this right to a clean environment will be realised.

EXTRATERRITORIAL OBLIGATIONS WITHIN INTERNATIONAL LAW

Considering the fact an obligation to fulfil is required when seeking to ensure environmental protection for the citizens of Ghana, it is important to research extraterritorial obligations to fulfil under international law. Considering the right to a clean environment has been derived from article 12 of the ICESCR, extraterritorial obligations to fulfil this right have to be examined. Article 2 of the ICESCR gives way for such obligations by emphasising the importance of international assistance and cooperation:

> "Each State Party to the present Covenant undertakes to take steps, individually and through international assistance and co-operation, especially economic and technical, to the maximum of its available resources, with a view to achieving progressively the full realization of the rights recognized in the present Covenant by all appropriate means, including particularly the adoption of legislative measures."

Thus, the ICESCR requires States parties to take steps through international assistance and cooperation to realise the right present in the ICESCR. The global character of article 2(1) gives the impression of extraterritorial obligations to ensure the realisation of the rights present in the ICESCR. This global character is reaffirmed by the fact there is no jurisdictional clause enclosed in the ICESCR (Langford, Coomans & Isa, 2013). Thus, on the basis of article 2(1), development aid is one of the steps developed states should take, to realise economic, social and cultural rights in developing states (Coomans, 2011).

The interpretations of the CESCR are even more progressive, by emphasising that it is particularly incumbent on States parties in a position to assists to provide international assistance and cooperation, in order to enable developing countries to fulfil their core obligations (CESCR general comment No. 14). Moreover, the CESCR emphasises that: "in the absence of an active programme of international assistance and cooperation on the part of all those States that are in a position to undertake one, the full realization of economic, social and cultural rights will remain an unfulfilled aspiration in many countries" (CESCR general comment No. 3).

Another interpretation of international cooperation and assistance is given by a group of experts in international law and human rights. These experts adopted the Maastricht Principles on Extraterritorial Obligations of States in the area of Economic, Social and Cultural Rights in 2011. The extraterritorial obligations to fulfil economic, social and cultural rights are laid down in principle 28: "all States must take action, separately, and jointly through international cooperation, to fulfil

economic, social and cultural rights of persons within their territories and extraterritorially […]" (Maastricht Principles, 2011). Thus, these principles in fact argue that extraterritorial obligations to fulfil the right to a clean environment exist. However, these principles are quite progressive interpretations of these obligations.

Although aforementioned presupposes the existence of the extraterritorial obligation to fulfil the right to a clean and healthy environment, such an obligation has been met with quite some disagreement. The argument has been brought forward that international cooperation and assistance, by means of development cooperation, should be seen as a moral obligation. While international cooperation and assistance as described in article 2(1) is a legal obligation, it is distinctly different from development cooperation – which is seen as a moral obligation (Economic and Social Council, 2006). Generally, Western States, such as the Netherlands, argued extraterritorial obligations to fulfil concerned important moral obligations, but not legal obligations. While, on the contrary, States from the South, such as Ghana, do characterise it as legal obligations (Coomans, 2011; Economic and Social Council, 2006).

In order to give rise to actual state responsibility, the duties to cooperate and provide assistance have to be specific enough that one can speak of a breach of the extraterritorial obligation to fulfil the right to a clean and healthy environment (Shelton, 2011). Such a possible breach can be brought forward (and thus reviewed) by means of a Communication to the CESCR, provided it concerns States parties to the Optional Protocol to the ICESCR (OP-ICESCR). However, both Ghana and the Netherlands have merely signed the OP-ICESCR and not yet ratified, which means they are not bound to this protocol.

There is also the possibility to review a possible breach by means of the Draft Articles on the Responsibility of States for Internationally Wrongful Acts. These articles have been used by the International Court of Justice (ICJ) in order to determine whether international obligations were violated by States parties (ILC, 2001). In this case, the court would have to decide whether the Netherlands' decision to stop international assistance towards Ghana would suffice as a breach of their international obligations. Such a breach is momentarily difficult to establish, but worthy take into account. Consequently, the focus will lie with the Netherlands' state responsibility.

NETHERLANDS' STATE RESPONSIBILITY

Considering extraterritorial obligations concerning the obligation to fulfil the human right to a clean environment are present within international law, the international community incurs such obligations. Specifically, the States parties which are in a position to assist, should partake in international assistance and cooperation. It has been established that the Netherlands is in a position to assists, considering among other things the Special Treat Project. The reason the Netherlands is considering to stop assistance is due to the increased economic growth, not due to their inability to further cooperation and assist. Furthermore, when looking at the development cooperation policy of the Netherlands, the emphasis lies with sustainability. Moreover, one of the main themes of the Netherlands' development cooperation policy is water management with a focus on the environment and climate (Dutch Government, 2017). Thus, the Netherlands' focus lies on aspects such as a clean environment within their development aid. However, it has to be verified if the Netherlands is in breach of an extraterritorial obligation. Only then, explicit state responsibility can be determined. To verify such a breach, it has to be determined whether their omission to provide aid is (1) attributable to the Netherlands under international law; and (2) constitutes a breach of an international obligation of the Netherlands (ILC, 2001). When focusing on these two conditions, firstly it is important to mention that not merely the Netherlands is in a position to assist Ghana. This means that other developed countries could also provide international assistance to Ghana. Secondly, the question whether the Netherlands is in breach of international obligations is contested, considering some countries define development cooperation as a moral obligation instead of a legal obligation.

Considering these different aspects have to be taken into account to establish the Netherlands' obligation to fulfil the right to a clean environment, state responsibility cannot be assigned to the Netherlands specifically, momentarily. However, considering the acknowledgement of an exterritorial obligation to fulfil the right to a clean environment within international law, as well as the

Netherlands' earlier conviction to help Ghana by means of development aid, it has to be recommended that the Netherlands does follow the obligations to fulfil the right to a clean environment. Furthermore, The Netherlands specifically stated that international cooperation "should be based on genuine dialogue, partnerships and technical cooperation programmes" (Economic and

Social Council, 2006). The Special Treat Project is a way to realise such a partnership. Therefore, The Netherlands should reconsider their intention to stop development aid towards Ghana in 2020. Thus, the Netherlands should continue their international assistance towards Ghana focused on sustainable development, if the dire environmental circumstances of the citizens in Ghana has not ceased to exists in 2020.

CONCLUSION

Within international law, the right to enjoy a clean and healthy environment has been established. Specifically, the ICESCR requires that human beings are able to enjoy the highest attainable standard of health and the CESCR explains this as the right to a healthy and clean environment. This interpretation has been recognised within international law. When focusing on the current situation in Ghana, an obligation to fulfil the right to a clean environment could satisfy aforementioned human right to the Ghanaian people. According to the principle of subsidiarity, Ghana is the first actor obliged to fulfil this right to the people of Ghana. However, when Ghana appears to be unable to do so, obligations incur for the international community. Within international law, the CESCR claims that States parties to the ICESCR, which are in a position to assist, should fulfil the right to a healthy and clean environment. The Netherlands is such a country, considering they are already assisting momentarily through the financial support of projects such as the Special Treat Project. Although the obligation to give international assistance is not explicitly acknowledged as a legal obligation by Western countries, it is seen as a moral obligation. Consequently, the Netherlands should continue their assistance after the 2020 deadline, if the right to a clean environment in Ghana remains unfulfilled.

4. PRIVATE SECTOR IN OR FOR DEVELOPMENT?

INTRODUCTION

According to Ploumen, Dutch Minister for Foreign Trade and Development Cooperation, low- and middle-income countries as Ghana are shifting from aid recipients to trade partners (Ministry of Foreign Affairs, 2013). Ploumen stated; "The term development aid will eventually disappear (...). In the future, it will be more about international cooperation as a combination of trade, investments and aid" (Righton, 2016). This statement is based on the economic growth of Ghana and the associated increasing activities of foreign companies. Because of this, Ghana strives to be an aid free country in 2020. This implies that Official Development Assistance (ODA) will gradually be replaced by economic ties, as trade agreements (Embassy of the Kingdom of the Netherlands Accra, 2014).

To reach this goal, Ghana will work together with international trading partners on inclusive growth and the transition of aid by trade and investment. The transition will contribute to inclusive and sustainable economic growth and to intensify bilateral economic relations. This way Ghana and its trading partners will both benefit (Ministry of Foreign Affairs, 2013).

As mentioned in the general introduction, economic growth does not immediately imply sustainable development. Therefore, Sustainable development seeks to balance three dimensions: social, economic and environmental (Kuhlman & Farrington, 2010), also translated in the three pillars of People, Planet and Profit (PPP).

In September 2015, the UN General Assembly formally adopted 17 Sustainable Development Goals (SDGs) that aim among other things, to end poverty and hunger, protect the planet, and promote prosperity by 2030. These universal targets are built on the targets of the Millennium Development Goals (MDGs) (Salazar and Katigbak, 2016). However, as mentioned in the general introduction, it can be stated that Ghana has to make a lot of progress to meet these SDGs, since several MDGs were not reached.

If Ghana intends to be aid free in 2020, ODA will gradually be phased out and the private sector will be one of the alternatives to ODA. The question that arises is to what extent the private sector can contribute in achieving the SDGs of Ghana if ODA will be replaced economic ties. Therefore, this chapter will investigate how the domestic and international private sector can contribute to the sustainable development of Ghana without ODA. By answering this question some insights will be given about the private sector's involvement in sustainable development of Ghana.

To find the conditions for the private sector to operate successful and effective in the sustainable development of Ghana, first the concept of Private Sector Development (PDS) will be discussed. Within PSD two mechanism will be investigated; Aid for Trade programme (AfT) and Public Private Partnership (PPP). Each mechanism will be discussed by using a case study. From these results, conclusion can be drawn on the private sector in sustainable development.

It should be said that in this paper no distinction is made between domestic and international private sector. Also, the objectives in this paper do not include a comparison between bilateral donors' PSD programs.

PRIVATE SECTOR DEVELOPMENT (PSD)

To investigate how the private sector can contribute to the sustainable development of Ghana, it is important to learn more about the history between development thinking and cooperation and the private sector.

HISTORICAL BACKGROUND DEVELOPMENT COOPERATION AND PRIVATE SECTOR

Around 1980 the central role of the state in development thinking and cooperation was discussed and consensus about the relation between development and economic growth was obtained.

This consensus came from the idea that poverty reduction is the main objective of development cooperation and that development is based on economic growth and the private is seen as a main driver of economic growth (Schulpen and Gibbon, 2002) (Vaes and Huyes, 2015).

Privatization of state-owned enterprises, strengthening market forces, increasing competition and reconsidering the role of the state became the catchwords around 1980. The role that the private sector began to play in development cooperation could not be ignored by the bilateral donors. Collaboration was strengthened and new programs in Private Sector Development (PSD) were adopted (Schulpen and Gibbon, 2002). PSD therefore consist of activities carried out by Governments and development organizations by creating an enabling environment for business to flourish (Di Bella e.a., 2013).

In short, the private sector ensures economic growth while the Government enables the environment for this to occur. The Government makes also sure that growth contributes to poverty reduction, does not contribute to environmental degradation and pays attention to gender equality (Schulpen and Gibbon, 2002).

However, the consensus of the 1980s did not fulfil its promises of poverty reduction. Around 1990 PSD received a lot of criticism and some adjustments in development programs were made.

As a result, the state regained a more central role in development thinking. This lay ground for a mixed-economy model with assigned roles for and partnerships between public and private sectors (Veas and Huyes, 2015). Since then the involvement of private sector in development cooperation has been a topic of discussion.

Thus, it can be said that the consensus from 1980 still has a great impact on development thinking and cooperation. In the past two decades, different mechanisms of PSD in development cooperation has been established and adjust to the different approaches in development thinking. In this research two mechanism will be discussed; Aid for Trade (AfT) and Public Private Partnership (PPP). These forms will be discussed to learn more about the private sector as an alternative of ODA. Both forms will be illustrated by two case studies. The first case study, Doha Round, will show the outcomes of the AfT programme. The second case study, The Special Treatment Project, will illustrate how PPP can be used. Afterwards, a debate about the pro's and the cons of the two PSD mechanism will be described.

AID FOR TRADE

Aid for Trade is aimed at supporting developing countries' economic growth through assistance to trade governance and the creation of enabling infrastructure, which will help to enforce PDS. (Langan and Scott, 2011). The concept of AfT, was already launched in 2006 by the WTO.

AfT is based on the idea that trade will stimulate economic growth. Economic growth will reduce poverty because prosperity will 'trickle down' to the poorest (Langan and Scott, 2011).

AfT will increase trade which is good for competition. Competition will reduce costs of production, access to products, services, knowledge and technologies that would otherwise be unavailable for less developed economies (Hynes and Holden, 2016).

Furthermore, AfT is launched to develop synergies between trade policy and development aid. So that the developing countries have ownership and alignment with developing strategies (Klingebiel, 2014). Through the interventions of AfT, poorer countries will have better access to global market and therefore be part of the globalization (Langan and Scott, 2011).
In the next case study, AfT will be illustrated and discussed.

THE DOHA ROUND

The Doha Round was the latest round of trade negotiations among the WTO membership (WTO, 2017). Its aim was to achieve major reform of the international trading system through the introduction of lower trade barriers and revised trade rules. When WTO launched the Doha Round, ministers placed development at the centre. Therefore, the Doha Round is also known as the Doha

Development Agenda (DDA). Ministers of the Doha Round stated: "We seek to place developing countries' needs and interests at the heart of the Work Programme adopted in this Declaration," In this context, enhanced market access, balanced rules, and well targeted, sustainably financed technical assistance and capacity-building programmes have important roles to play." (WTO, 2017).

During the negotiations the EU, announced an increase of AfT spending to €3 billion by 2010.

Other countries as the US additionally promised that it would double its annual AfT spending to $2.7 billion, However, this was made explicitly conditional on 'market access expansion and the elimination of trade-distorting subsidies' by developing countries via their continued participation in the Doha Development Agenda (Landan and Scott, 2011).

DEBATE

There is an interesting debate about the effectiveness of AfT. Several studies show Doha Development Agenda strengthened trade performance and that AfT helped by improving infrastructure (Melo and Laurent, 2015). Other authors stated that it is hard to find evidence to prove that AfT is effective. This could be said since aid flows characterized as AFT is dwarfed by other sources of capital flows.

However, Landan and Scott (2011) argue that the outcomes of the Doha Round did not eradicate poverty at all. This kind of support, improving infrastructure, doesn't contribute to sustainable development. It only creates unjust trade regimes who are solidified through nominal support to trade capacity building.

Landan and Scott also argue that donors' reasons for providing AfT is that it encourages their own private sectors to have a more global presence. Therefore, one could questioning the intentions of the donors.

The last two arguments are interesting since this research is about sustainable development. Economic growth, which AfT strengthen, is only one of the three pillars of sustainable development.

The question that arises is; could AfT also contribute to the social and the environmental pillar of sustainable development? Some authors argue that the private sector is only interesting in investing in profitable sectors (Hynes and Holden, 2016). Some SDG's as Climate Action and Gender Equality are not the main business of the private sector. In this line Jabik and Bawakyillenuo (2016) argue that the private sector operating in Ghana has little or no concern for sustainability which have led to deforestation, land degradation, air and water pollution, soil erosion, overgrazing, and destruction of bio- diversity in Ghana (Bawakyillenuo & Jabik, 2016).

It can be concluded that the mechanism of AfT only fuels the economic pillar of sustainable development. In the light of this research AfT is therefore not suitable to use in PSD and other alternatives must be found. Subsequently development impact should be more prioritized instead of profits in order to make PSD more successful. However, according to Vaes and Huyes (2012) there is an obvious contradiction between developmental aims and for-profit aims. How to marry them that is the question.

PUBLIC PRIVATE PARNERSCHIP

A way in which PSD is also formed is the Public–Private Partnerships (PPP) where there is at least one public and one private actor working together for development purposes. PPP operates in specific thematic areas, such as health and water (Klingebiel, 2015). With the PPP, the private sector is mostly used as implementer of aid programmes.

By working with the public sector the responsibilities, risks, but also expertise are shared (Ameyaw and Chan, 2015). PPP is also beneficial because the private sector can contribute by financing projects (Veas and Huyes, 2015). PPP also improves policies designs and implementations. Furthermore, PPP strengthen political mandate (PPPLab, 2016). In the next case study, PPP will be illustrated and discussed.

SPECIAL TREAT PROJECT

The case study is part of Netherlands Ghana WASH Programma (GNWP) which is discussed in the introduction at chapter one. Part of the WASH programme is the Ghana Wash Window which is Public Private Partnership. Under the WASH window, the Dutch Government invests in innovative solutions and business models that focus on solving water, sanitation and waste-related hygiene problems (MDF, 2014). The Special Treat Project is part of the WASH Window.

The Special Treat Project is funded for 70 percent by the Netherlands Enterprise Agency (RVO, 2017). The remaining part is financed by the private sector, of which the biggest share originates from Ghana's private sector. The public sector is the leading party in this partnership. In total eight partners signed a Partnership Collaboration Agreement to commit to the objectives set by the Netherlands Enterprise Agency. These objects are the so called FIETS criteria. To ensure that sustainability objectives are included in the project (Netherlands Enterprise Agency, 2014) (The Special Treat Project, 2016).

DEBATE

Since the project is just started, no conclusion can be drawn on the effectivity of the project. However, some critical notes, supported by findings from the literature, can be placed by looking at the implementation phase of this project.

In this PPP, the private sector plays the role of expertise provider by bringing knowledge on the purification of waste water and the production for biogas and fertilizer. It also plays the role of implementer. The private sector is also providing financial resources. However, it could be said that the Dutch private sector is lifting on the 70 percent funding by the Dutch Government.

Peter Rozemond, project manager by MDF Training & Consultancy and initiator of the project, argues that the Dutch private sector fails to see the long-term business opportunities around the project (Rozemond, 2017). For instance, the business model on the marketing of biogas and fertilizer has not been further investigated by the Dutch private sector. Their focus is on the improvement of the sanitation in Ghana; the objectives set by the Netherlands Enterprises Agency. The two private partners from Ghana, who are in fact investing a lot, see the business opportunities in the longer run and are trying to make profit out of the biogas and fertilizers. This shows how the funding and the guidance by the Netherlands Enterprise Agency weaken the market-based principles as pointed out by Estrup (2009).

According to Estrup the PSD is based on the principles of free market forces. In line with this neo-classical theory, ODA will be inefficient, because PSD will be most effectively when left to market forces and a liberalized global economy (Estrup, 2009). It could be said that aid in the private sector

might slow down trade.

However, if there is no interference by the state, would the private sector still invest in sectors where profit is hard to achieve? As mentioned before, the private sector is only interesting in investing in profitable areas. It can be stated that when the private sector won't be financial supported and guidance by the Dutch Government programs as the Netherlands Ghana WASH Programme (GNWP) will not exist anymore. Most of these programs are funded for a significant amount by the Dutch Government which makes them attractive for the private sector, because it lowers the investment risk (Salaza and Katigbak, 2016).

The Ghanaian and Dutch Governments are in fact ensuring that the pillars of planet and profit are also included in these projects. Therefore, it could be said that involvement of the public sector is needed to achieve sustainable development.

However, projects cannot rely solely on public investment and guidance. Although public investment and ODA remain to be the fundamental sources of finance, increased private sector investment on sustainable development sectors can help bridge the finance gap that is needed to achieve the SDGs (Salaza and Katigbak, 2016).

Learning from the Special Treatment Project is can be concluded that PPP works because these partnerships encourage the private sector to invest in sectors where they normally would not invest because of the financial risks. PPP also provides guidelines which will ensure the sustainable development. However, from the Special Treatment project it can also be concluded that the financial share of the private sector should be more than 30 percent because otherwise the private sector won't be encouraged to be efficient which will be weaken the economic pillar of sustainable development.

PRIVATE SECTOR *IN* DEVELOPMENT AND *FOR* DEVELOPMENT

The conclusions drawn from the two case studies and discussion can be placed under two categories. These two categories will make the involvement of the private sector in development explicit. The first category is the 'the private sector *in* development (PSinD)' this generally refers activities of the private sector that are part of regular core business which have effect on development outcomes and economic growth through positive impact such as job creation, provision of goods and services. AfT can be seen as PSinD, since it does improve economic growth, but no other aspects of sustainable development. PSinD has therefore also negatives impact as environmental degradation and poor labour practices (Di Bella e.a., 2013).

The other category, is 'the private sector *for* development (PS4D)'. With PS4D the private actor takes initiatives in a way that go beyond their regular business practices. It is about finding ways to mobilize businesses' resources, their expertise, networks, data, and financial, technical and innovation capacity in the pursuit of SDGs (Vaes an Huyse, 2012). PPP can be part of PS4D. However, as mentioned before, even in PS4D the objectives from the private sector are not always the same as donors.

Although PS4D is not easily done, it is the most desirable for achieving SDGs. Therefore, more understanding about where the alignment of interests takes place and how risk between public and private partners can be balanced is needed. Byers and Rosengren (2012) argue that profit aims and developmental objectives can be married. This can only be done if private sector partners and development policy makers learn to listen to each other's language, and understand their perspectives and final goals before common ground and approaches can really be found

DISCUSSION

In this paper, the focus was mainly on the private sector as an alternative of the ODA. Because of this the influence of the Non-Governmental Organisations (NGO's) programmes on sustainable development were neglected. However, in the light of Ghana foreign policy discussed in this paper it was more interesting to do research on the private sector in development.

Another aspect that must be taken in account is that PSD takes on many forms at many levels. In this paper only two mechanism supported by two case studies were discussed. The conclusion drawn from these case studies could be premature. However, conclusions drawn from the case studies were carefully substantiated by findings from literature.

Another interesting aspect is the fact that the focus in the last case study is on the bilateral relation between Ghana and the Netherlands. However, this partnership will only be a small amount of all the financial donor support sent to Ghana. No comparison between other bilateral donors' PSD programs were made. However, the bilateral relation between the Netherlands and Ghana can be exemplary for other bilateral relations between Ghana and other developed countries. For instance, it is stated that the development policies of the Netherlands can be compared with Denmark, UK, Sweden and Germany (Byiers, Große-Puppendahl, Huyse, Rosengren and Vaes, 2016).

Finally, the overall effectiveness of PDS on sustainable development is hard to measure. Scholars argue that there is not enough evidence of the actual development impact of PSD and involvement in developing countries. To find enough evidence to substantiated the conclusions, many insights from different authors were used.

CONCLUSION

In this chapter, it was investigated how the private sector can contribute to the sustainable development of Ghana if ODA would be replaced by economic ties. The private sector is an important driver of economic growth. Due the 'trickle down' effect, economic growth can help to reduce poverty. PSD is therefore important because it can strengthen the private sector by creating an enabling environment for business to flourish.

To support developing countries' economic growth, AfT was introduced. AfT will enforce PDS by creating trade regimes and improving the infrastructure of a developing country. AfT policies opened the global market for developing countries, however it also created unjust trade regimes which did not reduce poverty. It can be concluded that AfT is beneficial for economic growth, one of the pillars of sustainable development. However AfT does not contribute to the welfare of Planet and People. Therefore, it can be concluded that AfT is PSinD, which doesn't contribute to all the facets of sustainable development.

Another form of PDS can be in found in PPP, where the public and the private sector work together on achieving sustainable development. With PPP responsibilities, risks, finance and expertise are shared. PPP can be seen as PS4D, because it tries to take in account all the aspects of sustainable development. However, in the Special Treat Project it became clear that it is more favourable when the private sector is an investor instead of using the funds of the state. It is said that the private sector will be most effective when left to market forces and a liberalized global economy. This will make the projects of PPP more sustainable which is good for the development of Ghana.

Nevertheless, if the private sector would only go for profit, some sectors that are important for sustainable development would not be interesting for the private sector, like the water and sanitation sector in Ghana. So how can profit and development aims be aligned? The answer lies in earlier mentioned PPP. The Special Treat Project is a good example, but a closer look at the relation between the public and the private sector is needed to make such projects more sustainable. There must be a better understanding about where the alignment of interests takes place and how risk between public and private partners can be balanced.

5. INTEGRATING INSIGHTS

In order to answer the research question; to what extent is sustainable development still possible if Ghana were to become aid free in 2020, research was done within three different disciplines and three different insights were given. In this chapter, the findings from these three different disciplines will be further discussed in order to gain a more comprehensive understanding. This will be done by first identifying the differences between the disciplinarian insights and the causes of these differences. The next step will be to create common ground between the conflicting concepts. After the different insights and concepts are modified, a more comprehensive understanding will be constructed.

CONFLICTS

Interdisciplinary research requires an understanding of the different disciplines, otherwise conflicts and common ground cannot be found. For instance, each discipline has its own epistemology, methods, assumptions, concepts and theories (Repko, 2012). During the integration, different insights will be integrated and a more comprehensive understanding will be constructed. However, some assumptions within a discipline must be modified in order to be integrated. Below different conflicts between the insights of the disciplines will be discussed.

SUSTAINABLE ENERGY SCIENCE

The discipline of Sustainable Energy Sciences is part of the Natural Sciences and the research done within this discipline is always of a descriptive nature. The goal of the research is to describe and analyse objects, processes and systems. The goal is not to give a value judgment or to substantiate an argument or opinion. Since within International Law and Development Geography it is common to give a value judgment it is necessary for the Sustainable Energy Sciences to do this as well in order to find common ground. Although it was not desirable to give such a value judgement it did not caused a problem, given there was enough evidence to substantiate the argument.

INTERNATIONAL LAW

The International Law perspective also has some conflicts with the method and assumption of Development Geography. From the perspective of International Law, when trying to achieve sustainable development, the emphasis lies with obligations for the international community. This means that first and foremost, states are responsible for the realisation of sustainable development. Primarily the state with territorial jurisdiction and subsidiary the rest of the international community. The fact Sustainable Geography lies such a great emphasis on the involvement of the private sector is problematic from this perspective, considering the private sector does not have the same obligations concerning sustainable development within international law.

DEVELOPMENT GEOGRAPHY

It became apparent in the chapter of Energy Sciences that Ghana is not capable of achieving sustainable development by themselves and international assistance is needed. However, from the perspective of Development Geography it is almost ‘arrogant’ to conclude that a country is not capable of taking care of itself. Within Development Geography there are many debates on the most effective method to develop, but none of these debates are about the incapability of countries to develop. Some scholars even say that aid is not effective and that sustainable development can only be realised from bottom up initiatives. The insights from the other disciplines are therefore somewhat

against the assumptions made in Development Geography. However, Development Geography also studies the effects of ODA, which is support from the public sector. This coincides with these insights from the other disciplines.

COMMON GROUND

STEP 1: ORGANISATION TECHNIQUE; USING THE CONCEPT OF SUSTAINABLE DEVELOPMENT

Above a few conflicts within assumptions and concepts are discussed. In order to integrate the insights of the three disciplines it is important to create a common ground. It is possible to find a common ground with the help of the organisation technique. This technique is described by Repko: "The technique of organization creates common ground by clarifying how certain phenomena interact and mapping the causal relationships" (2012, p. 346). When analysing the different insights and concepts given by Sustainable Energy Sciences, International Law, and Development Geography there is an apparent consensus these disciplines all incorporate, namely the importance of sustainable development. Sustainable development is traditionally divided into People, Planet and Profit, PPP, as mentioned in the introduction. These three P's have also been taken into account in each of the disciplinary researches for the sustainable development of Ghana. Each of the disciplines focuses on at least one P and thereby an overall relation with the sustainable development of Ghana is present. To fully comprehend how these disciplines characterise this concept, it is important to analyse how the disciplinary insights are connected to the three P's.

PLANET

People and Profit are important components for Sustainable Energy Sciences, but the primary focus always lies with the P for Planet. This research on the influence of international support on the renewable electricity production of Ghana shows mainly the benefits for the planet, since a renewable energy production leads to lower emissions of greenhouse gases that enhance global climate change. These effects could have influence on the other Ps, but these were side effects in this research since these are seen as a priority within this discipline.

From the perspective of Development Geography Planet is also seen as an important component of sustainable development. However, in practise the human aspect of sustainable development is more discussed and defended in the literature. In this research, the P of Planet is hardly discussed by the discipline of Development Geography.

Planet also has to be taken into account from the perspective of International Law. Namely, the environmental circumstances can have direct influences on the living conditions of human beings. Hereby, the focus still lies with human beings, but there is a certain recognition of the importance of the planet.

PEOPLE

During this research, the primary focus of International Law discipline is on the second P for People. This research established an extraterritorial obligation to provide a clean and healthy environment for the Ghanaian people in order to enable people to enjoy their right to health, which is a human rights-based approach of sustainable development. This approach to sustainable development can be described as anthropocentric and therefore emphasises the importance of the P for People. As mentioned before, Development Geography lays a great deal on the People of sustainable development. It tries however to find an equilibrium with the other P's. In the research of the discipline of the Sustainable Energy Scientist People was a big part of the research, since because of

the problem with people, the need for accessibility to the electricity grid, other problems occur. This shows that People is an indeed an important aspect, but rather as a reason or motivation to research effects on Planet.

PROFIT

The Development Geographer looked at all the three P's for sustainable development. The research on the private sector, as a possible alternative for development support, shows that a relationship between the public and private sectors (Public Private Partnership) can lead to a sustainable development in Ghana. Since the focus lies on the private sector, it can be said that the main focus of this sub-research has been on the Profit.

From the perspective of International Law, specifically Human Rights Law, the focus primarily does not lie with Profit. However, as discussed, primary obligations to fulfil human rights lie with the domestic state. When a domestic state is capable to realise human rights, international obligations do not have to incur. In this sense, Profit does have an influence on Human Rights Law.

Within the Sustainable Energy Sciences Profit can, like People, be a reason or motivation for research on the effects on Planet, but it can also be a tool. When doing research on Planet an important aspect can be to find the cost of certain outcomes, depending on the situation and research done.

PPP

All the disciplines have a main focus on different aspects of sustainable development. The three P's are still separate segments as shown in figure 9. These segments separately do not fully contribute to a sustainable development in Ghana, but by using the organisation technique it is possible to find a common ground which contributes to sustainable development. The overall relation of the different disciplinary insights, namely sustainable development, first showed the different segments of sustainable development and how the disciplines interacted within this concept. Because of the organisation technique, the common ground has been established by the interaction of the disciplines with the PPP.

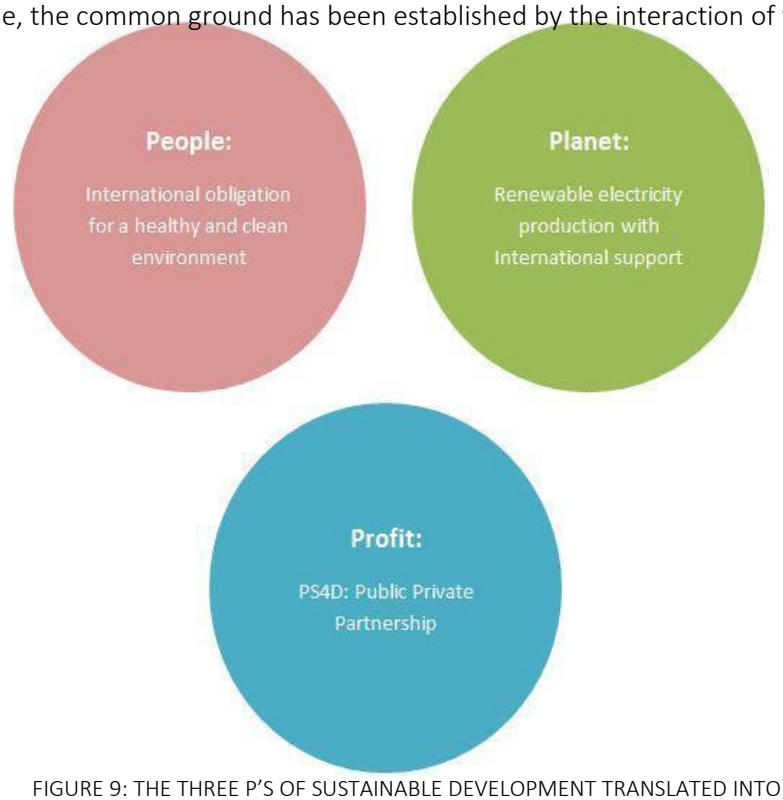

FIGURE 9: THE THREE P'S OF SUSTAINABLE DEVELOPMENT TRANSLATED INTO THE INSIGHTS OF THIS RESEARCH.

By organising the three P's according to this research some other important aspects of the three P's were omitted. For instance, Planet is not only about renewable energy. Planet is about the earth's natural resources, including the ecosystems. Renewable energy is a way to reduce depletion of the natural resources of the earth. The same accounts for People; in this research the focus was on the healthy living conditions of the people of Ghana. However, People also means that all individuals are treated fairly, this includes gender equality, good access to education systems etc. And the last P, Profit, is not only about the economic progress provided by the public and private sector. Profit also includes Government revenues.

Thus, the P's used in this research cannot be translated into the broader interpretations of the three P's of sustainable development. It could be said that by omitting the other aspects of the P's, this interdisciplinary research did not cover all the components of sustainable development as mentioned in the introduction. To some extent this is the case, since the air and water quality of Ghana could also been investigated to help answer the research question. Due to lack of time and resources a broader investigation, with all the components of the three P's, was not possible. However, the insights of the three disciplines have made a useful contributions to this research. Each component of the P's answered a part of the research question and together a common ground was created. However, it is good to keep in mind that some aspects of sustainable development were not discussed and more research is needed.

STEP 2: EXTENSION TECHNIQUE; INTEGRATING PLANET AND PEOPLE

As mentioned above, the three P's have been analysed through the insights of the different disciplines. The P from Planet is explained from the perspective of renewable energy. The P of People is interpreted from the perspective of International Law and the last P from Profit is completed by using the Public Private Partnership as an alternative. As describe above, each P seems to answer a part of the research question

However, placing the insights of the three disciplines alongside each other, does not create a thorough common ground. Each discipline gives a separate contribution, which makes the research more multidisciplinary but not yet interdisciplinary. Interdisciplinary research, as defined by Repko, is research that answers a complex question by drawing on disciplinary insights and integrating them (Repko, 2012). By integrating the disciplinary insights, a more comprehensive understanding can be found. A more comprehensive understanding is the integration of insights to produce a new and more nuanced whole (Repko, 2012).

Therefore, one should take a closer look at each segment of the PPP, and how they have been interpreted by the aforementioned disciplines. Is there merely common ground or are there also some conflicts? Planet and People seem to conclude that international assistance is required to enable the sustainable development of Ghana. From the perspective of a Sustainable Energy specialist, international assistance is required because Ghana is still lacking in the production of renewable electricity, which is of importance in order to sustain natural resources. In the past international assistance has contributed significantly to the establishment of renewable energy in Ghana. However, from the point of view of International Law, international assistance is obliged because the people of Ghana have the right to a clean environment. If Ghana cannot fulfil this right,

other states are obliged to assist Ghana. While the Sustainable Energy specialist emphasises the importance of sustainable development in order to sustain natural resources, the International legal specialist emphasises the importance of sustainable development by using an anthropocentric approach.

Thus, the question raises how to marry the right to a clean environment with the lack of the production of renewable energy? The right to a clean environment focuses on the healthy living conditions of the people in Ghana, while renewable energy is more focused on the impact of energy production on the earth. So, do the insights on renewable energy fall under the right to clean environment? If these insights cannot be integrated, the right to a clean environment cannot be used to oblige states to support sustainable development, it can only oblige states to improve the living conditions. So, how can Planet and People align in this research?

By using the technique of extension, increasing the scope, the pillars of the Planet and the People can integrate. According to Newell extension involves, addressing differences in disciplinary concepts by extending their meaning beyond the domain of the discipline that originated them into the domain of the other relevant discipline (2007). Extension can be used by making the connection between the direct and indirect effects of the production of renewable energy and the living conditions of the people of Ghana. The production of renewable electricity is usually much cleaner than the production of electricity from non-renewable energy sources like coal (Haines e.a., 2010). Production of renewable electricity can therefore contribute directly to the improvement of the living conditions, by improving the health conditions. Furthermore, the transition towards renewable energy based electricity production will indirectly improve the living condition of the Ghanaian people by countering climate change. This extension of the insights from Planet with People makes the right to clean environment account for both P's. This is beneficial for both disciplines because now Planet and People both address the need for sustainable development and the obligation for international assistance.

STEP 3: EXTENSION AND REDEFINITION TECHNIQUE: INTEGRATING PROFIT

Considering Planet and People are integrated, the last P (Profit) should be examined. From the insights of the Development Geographer the private sector could partially replace public international assistance by using the Public Private Partnership. However, this is not aligned with the insights of International Law. According to the insights given by the International legal expert, the international community, and therefore the public sector, is obliged to take action when sustainable development goals are not realised. However, there is no mention of any obligations for the private sector, within the research on international obligations to ensure the right to a clean and healthy environment. Again, the technique of extension can be used to integrated these differences. Starting with extending the assumption that international assistance can only be given by the public sector. International assistance can also be given in the form of Public Private Partnership. From the insights of the Development Geographer it can even be said that Public Private Partnership is more effective in establishing sustainable development and therefore improving living conditions. The right to clean environment states that international assistance is obliged, but with the extension technique the private sector can partially substitute the function of international assistance. It must be noted that by this integration technique the definition of Profit is redefined into Public Private Partnership. This technique of redefinition is used to redefine different concepts into one common meaning (Repko, 2012). By using these two integration techniques the insights and meanings of People and Profit are integrated.

A MORE COMPREHENSIVE UNDERSTANDING

By creating common ground a more comprehensive understanding can be constructed. By means of this, the research question will be answered. Constructing the more comprehensive understanding is carried out by using the created common ground in step 1,2 and 3 to integrate the various concepts that compose the complex problem in Ghana (Repko, 2012). Repko states: "This action is usually described in a written narrative, the purpose of which is to explain how the modified concept, assumption, theory is inclusive of the others and fits best with the available evidence" (Repko, p.384, 2012). This narrative can include a figure in other to visualise the more comprehensive understanding. Figure 10 shows this newly found common ground within the concept of sustainable development. This is the foundation of the more comprehensive understanding (Repko, 2012).

Within the concept of sustainable development all the insights of the three disciplines are modified. Together, the redefinition of People, Planet and Profit have provided a more comprehensive understanding that answers the research question; to what extent is sustainable development still possible if Ghana were to become aid free in 2020.

Namely, it would not be ideal for Ghana to become aid free in 2020, because the international aid is necessary, and even obligatory, to ensure sustainable development in Ghana as defined within the P of People. To make the transition to renewable energy, as described within the P of planet, Ghana needs international support. A degree of involvement of the public sector can be substituted by the private sector, but international aid is still an important element to ensure sustainable development in Ghana, as stated in Profit. Together the three P's conclude that sustainable development of Ghana cannot be completely achieved without international support.

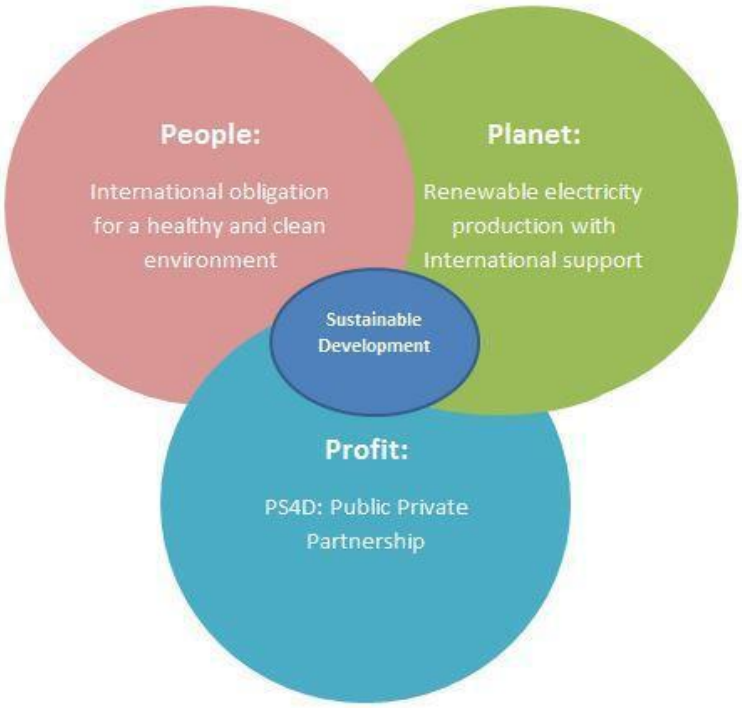

FIGURE 10: A MORE COMPREHENSIVE UNDERSTANDING.

6. DISCUSSION

In the previous chapter the integration of the different insights is accomplished. It is however interesting to point out the strengths and the limitations of this interdisciplinary research to value its conclusion.

OTHER DISCIPLINES WHICH COULD HAVE CONTRIBUTED

Apart from Sustainable Energy Sciences, International Law, and Development Geography, other disciplines could have contributed to this interdisciplinary research. As mentioned, Economics and International Relations could have given important insights. The economic growth of Ghana could have been examined more thoroughly, which could have been of importance, considering the foundation of the thesis is based on the assumption that the economic growth does not always coincide with the Millennium Development Goals. Furthermore, the discipline International Relations could have provided important information concerning the bilateral relationship between Ghana and the Netherlands. Although Ghana strives to become aid-free in 2020, this does not mean that the relationship between Ghana and the Netherlands will also come to an end. This discipline could have shown in which ways Ghana and the Netherlands would still be connected.

PREDICTIONS ABOUT THE FUTURE

The research question; whether Ghana should become aid-free in 2020, is focused on a time in the future. This is something which can be criticised. All three disciplines used past or present findings to come to a conclusion. However, it is difficult to make predictions while mainly focusing on the past. The predictions made in this research are thoroughly substantiated by findings in the literature and international regulations. However, the conclusions drawn from this research cannot be tested yet, because only after 2020, outcomes will be able to be discussed. Furthermore, within international law some assumptions about the situation of the Ghanaian people in 2020 are made. In practice, a court has to decide whether the obligations that incur from these circumstances have to be honoured.

However, by learning from the past, advice can be given since it is possible to learn from the mistakes already made. In the future, these mistakes will be easier to prevent and this will increase the chances to make the decisions that will lead to a sustainable development in Ghana.
The differences between the disciplines

REFLECTING ON REPKO

Different aspects of Repko's interdisciplinary research should also be reflected on. During the integration, different components could be criticised or developed more fully.

CRITISISM ON THE INTEGRATION TECHNIQUE: EXTENSION

The integration technique extension, allowed for an integration of the different insights of the disciplines. However, by using this technique, each discipline had to renounce a part of their own insights. Although this allowed for an integration, this could be criticised, considering it alters the original findings of the disciplines. For example, the fact the People and Planet did not coincide with each other from the perspectives of International Law and Sustainable Energy Sciences, brought about the extension of the international obligations to fulfil the right to a clean environment. However, within international law such an extension is traditionally not valid. Within international law, legal positivism states that the law is socially constructed and to be followed completely. However, through such an extension, the law is interpreted more freely. A positivist jurist would not agree with such an interpretation. Nevertheless, naturalist jurists do believe in such interpretation

techniques when trying to solve societal problems. Thus, such an extension is allowed, but frequently criticised.

CRITISISM ON THE CONSTRUCTION OF THE MORE COMPREHENSIVE UNDERSTANDING

Repko's way of creating a more comprehensive understanding focuses primarily on the creation of a new theory instead of concepts. He does mention a way to construct the more comprehensive understanding from modified concepts, but analyses this action very briefly. However, within this interdisciplinary research the integration was built on the concept of sustainable development. Considering the doctrine of the integration is the sustainable development described as the PPP, there was no room for a creation of the more comprehensive understanding based on theories. Therefore, Repko lacked in sufficiently contributing to the integration by means of concepts.

MERELY REPKO APPLIED

Integration techniques were used on the insights of the three disciplines to integrate their own epistemology, methods, assumptions, concepts and theories in order to make the integration process possible. Although this did not lead to major issues as described above, a critical note can be placed by the fact that the interdisciplinary research was solely based on theories and methods of one author; Repko. Therefore, no comparison could be made between different authors. The question is whether this is a problem, since the techniques by Repko are applied carefully and a more comprehensive understanding of this research is critically established. It would however be interesting for further research to see what other integration techniques would have established and what the outcomes could have been.

ALTERNATIVE INTEGRATION

Within the integration, the decision was made to use the PPP as a doctrine within this interdisciplinary research. However, this decision led to the exclusion of other possible integrations to create the common ground. It would have been a possibility to focus on the differences concerning priorities in time. Whereas International Law focuses on present circumstances and if certain actions are necessary to change the circumstances. In the case of Ghana, whether international obligations exist. On the other hand, Development Geography focuses on the processes to create sustainable development by means of different actors. Finally, Sustainable Energy Sciences focuses on the eventual goal. Different integration techniques could have been used to create a common ground between these different priorities. This could have contributed to the final integration.

REFLECTING ON INTERDISCIPLINARY RESEARCH

As mentioned, by using integration techniques, every discipline might have to renounce part of their findings. Within each discipline one has to focus on certain aspects which can be integrated with the other disciplines. This could lead to partly neglecting other disciplinary findings which weakens the foundations of the conclusions. Therefore, one could say that the more comprehensive understanding of this research is too limited, because it is neglecting the nuances of the insights of the disciplines.

However, although the integration techniques might undermine partly the disciplinary insights, the complex question of Ghana could be answered. By means of integrating the different disciplinary insights it was possible the fully answer the interdisciplinary research question, by means of a more comprehensive understanding.

7.CONCLUSION

All the disciplines gave insight into the consequences of Ghana's desire to become aid-free in 2020, with a focus on sustainable development. The insight from Sustainable Energy Sciences explained that Ghana's large potential to produce electricity in a sustainable way and the success of the international projects have shown the importance of international support to help Ghana towards a sustainable future. The insight from International Law has shown that Ghana is the first actor obliged to fulfil the right to enjoy a clean and healthy environment for the people of Ghana. However, international community obligations incur when Ghana appears to be unable to fulfil this right. Development Geography suggest that the public and the private sector should work together in a partnership to share responsibilities, risks, finance and expertise in order to achieve sustainable development.

The different disciplinary insights had to be integrated to fully comprehend whether sustainable development is still possible in Ghana if the country were to become aid free in 2020.

Consequently, the main research question; "to what extent is sustainable development still possible in Ghana if they were to become aid free in 2020?" will be answered. Namely, it would not be ideal for Ghana to become aid free in 2020. The international support is necessary, and even obliged, to ensure sustainable development in Ghana. Public and Private partnership is also an important element to ensure sustainable development in Ghana. Finally, it can be concluded that sustainable development of Ghana cannot be completely achieved without international support.

This shows that although economic development is important, it is not the most important part of a countries development. Therefore, focusing mainly on economic development does not guarantee that all the aspects that are important for national and international policy making are taken into account. It is of great importance to include concepts like sustainable development when deciding over international agreements. Therefore, it is recommended to reconsider the intention of the Ghana Consultative Group for Ghana to become aid-free in 2020. Future research is needed to establish how Ghana could guarantee sustainable development without international support.

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