

# The uptake of doctoral thesis research in Ghana

by  
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**Declaration**

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## Abstract

Doctoral studies are a big resource to contribute to knowledge which by extension assists in creating new product development, new professional practice and the development of new technologies. Across selected countries in Africa, the number of PhD holders has increased immensely over the last decade with no sign of it decreasing yet not much of the findings from these researches have been implemented. This study is concerned with the uptake of doctoral research findings in the Environmental and Natural Resource sciences at universities in Ghana. The overarching aim of the study was to determine the uptake of PhD research conducted in Ghana amongst PhD holders in Ghana in the field of ENRS, during and after PhD studies. This is a descriptive study which integrated different methods including content analysis of completed theses, a CV-analysis of the authors, bibliometric studies of publications that ensued from the doctoral theses and finally in-depth interviews with the authors of the theses. Twenty PhD authors were interviewed for the study.

The results of the study found that most students who undertook doctoral studies had two main motives why they undertook PhD studies: improving their horizon and employment motives. Their motivation was not to add new knowledge. Interviewees who believed they had produced new knowledge from their studies pushed for the uptake of their findings and recommendations. Interviewees published a reasonable number of journal articles but fewer book chapters and policy briefs. The study found that some interviewees were motivated to publish by their supervisors, others because by the practices and requirement of their university they were required to publish. Interviewees who are in academe and research jobs published because they believed it was a requirement for their evaluation for promotion in their career. However, whilst it is good for supervisors and universities to encourage their PhD students and staff respectively to publish not all these publications were good. We discovered that a significant proportion of the journal articles actually appeared in predatory journals.

The results of the interviews did find that research uptake can effectively be optimized through co-operation and collaboration with stakeholders. The major factor that warranted the above was by interviewee working in the same field as he or she did during the PhD and continuous collaboration with institutions that he or she collaborated with during PhD and afterwards. The results discussed in this chapter show amongst others that there is no systematic attempt on the part of researchers to monitor the uptake and citation impact of their research findings.

The study concludes that there is little awareness and appreciation of the need for uptake of research findings to policy and practice. There also seems to be the view that researchers must produce new knowledge but not necessarily be the ones that should attempt to optimize the uptake of their findings beyond the expectation of proper communication of results through presentations and publications.

The study recommends that Universities should not pay lip service to the importance doctoral education play in their research system. Doctoral education should be well defined including creating appropriate platform and well defined mechanisms for the communicating and possible uptake of their findings. Systems should be put in place in universities and research institutions to engage stakeholders constantly on research findings. Research accountability should be a concern for all universities to ensure possible uptake of research findings and recommendations.

## Opsomming

Doktorale studies is 'n beduidende hulpbron in die produksie van kennis en by implikasie in die skep van nuwe produkte, nuwe professionele praktyke en nuwe tegnologieë. Verskeie lande in Afrika het oor die afgelope dekade 'n buitengewone toename in die getal doktorale kandidate en tesisse beleef. Hierdie studie fokus op die mate waartoe doktorale resultate benut word en wel op die terrein van navorsing oor omgewingsake en natuurlike hulpbronne in Ghana. Die oorkoepelende doel van die studie was om te bepaal wat die aard en omvang van die benutting van doktorale studies was vir 'n steekproef van doktorale studente wat hul tesisse in hierdie twee terreine sedert 2000 voltooi het.

Die studie was grotendeels beskrywend maar het verskeie metodes geïntegreer, naamlik 'n inhoudsontleding van tesisse, 'n CV-ontleding van die outeurs, bibliometriese analises van die navorsingsuitsette van die kandidate en ten slotte, in-diepte onderhoude met twintig van die kandidate.

Die studie het ondermeer bevind dat doktorale kandidate hul studies onderneem het met twee motiverings: eerstens, om hul verwysingsraamwerke te verbreed; en tweedens, om hul werksituasie te verbeter. Weinig van hulle het aangedui dat die produksie van nuwe kennis 'n groot oorweging was om doktorale studies te doen.

Die kandidate wat in die studie ingesluit is, het 'n redelike getal tydskrifartikels, boekhoofstukke en beleidsdokumente geproduseer. Sommige respondente het in die onderhoude aangedui dat hul deur hul studieleiers aangemoedig is om te publiseer; andere het dit gedoen omdat dit 'n vereiste van hul universiteit of werkplek is. Oor die algemeen het oorwegings rondom loopbaanbevordering en prestasie-evaluasie ook 'n rol gespeel. Ongelukkig het dit geblyk dat nie al die publikasies wat geproduseer is in "outentieke" wetenskaplike joernale verskyn het nie. 'n Beduidende proporsie (21%) van al die artikels wat geproduseer is, het in "roofjoernale" (predatory journals) verskyn. Hierdie joernale is nie legitieme joernale nie, maar bestaan bloot om geld te maak uit akademië en graduandi.

Die studie het ook bevind dat navorsingsbenutting verbeter wanneer daar samewerking met verskeie belanghebbendes in die navorsingsproses is. Onder meer het geblyk dat kandidate wat na die voltooiing van die PhD in dieselfde veld werk as die onderwerp van hul studies, oor beter netwerke en samewerkings beskik. Hierdie feit het vervolgens gelei tot meer geleenthede tot benutting van die PhD resultate.

Maar die studie het ook bevind dat die meeste van die kandidate geen sistematiese pogings aangewend het om die bevinding en aanbevelings van hul studies doelbewus te benut of benut te kry nie. Hierdie bevinding korreleer ook met 'n ander bevinding van die studie: weinig van die doktorale graduandi moniteer of hul PhD of enige publikasies wat uit die PhD gevloei het, deur ander akademië of wetenskaplikes aangehaal word. Om die waarheid te sê het dit geblyk dat die meeste van die kandidate nie eers bewus is hoe om sitasie-platforms te gebruik nie.

Opsommenderwys kan gestel word dat die studie bevind het dat daar weinig bewustheid en waardering is van die nodigheid om navorsingsbevindings te benut vir beleid of die praktyk. Intendeel, die meeste van die kandidate huldig die siening dat hul verantwoordelikheid hoogstens is om die bevindinge te kommunikeer en dat die benutting en moontlik impak daarvan oorgelaat moet word aan ander akteurs.

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## INTRODUCTION

### **Preliminary Study and rationale**

Universities in Africa were established in the 1940s with the dual mission of teaching and research. However, due to many factors, teaching seems to have become the de facto mission of many of these universities. It is only over the past decade that the research mission seems to have emerged again as a key function of African universities.

Since the end of 1970s, African universities have moved through various characterisations, being labelled as teaching, vocational, and then developmental universities among others (Lulat, 2003). Ghanaian universities have followed the same trajectory and shifted from their original mission. The latest shift has been necessitated by calls from international donors; the world university rankings; calls from stakeholders; internationalization; massification and most recently a striving to achieve “world-class university” status.

What has come to be known as “World class university (WCU)” has become the new catch all phrase describing leading universities of the world. Most criteria for defining a WCU includes high quality doctoral education; PhD enrolment and graduation and cutting edge doctoral research in these universities. In short, doctoral studies is a core part of any WCU.

Doctoral studies are a big resource to contribute to knowledge which by extension helps in creating new product development, new professional practice and the development of new technologies. In addition, doctoral education lies at the core of a university’s research capacity and is also seen as the primary source of research productivity and innovation in the global knowledge economy (Nerad & Heggeland, 2008).

It is clear that universities, in addition to their other missions of teaching and learning and community engagement, are significant sites for knowledge production in a country (Ewusi, 1986; Kerr, 2001; and Boateng, 2007). Through their teaching and research, new knowledge and refinements of existing knowledge are translated into teaching, policy and production processes as well as into social life as a whole (Manuah and Sulley, 2003 and Twum- Barima, 1976). According to Crossman and Devisch (1999), and Sawyer (2004) universities are central to the knowledge systems. Sall *et al.*, (2003) adds that an important way in which universities affect society is through the quality of their teaching and research and the effectiveness of their contributions to policy, production and management, as well as to solving social problems.

Although Africa's universities continue to provide research and train researchers which is a key condition for its development, the uptake and utilization of the knowledge from such research is minimal (Sall *et al*, 2003; Twum-Barima, 197; and Jebuni, 1998). Similarly, in Ghana, doctoral research generates some knowledge which is relevant for the economy and national development but a critical problem is the uptake and the utilization of this knowledge. This is particularly evident in the fields of natural and environmental sciences, where the knowledge that is generated – also from doctoral research - can help address and resolve some of the challenges the country is facing at the local and national level.

Doctoral studies in the fields of Environmental and natural Resource Science (ENRS) have increased steadily in the major public universities in Ghana and also amongst Ghanaians who undertook (and some still undertaking) their PhD abroad over the past decade. Many of these studies aim to tackle the problems associated with natural resources and environmental management, yet not much of the findings from these researches seem to have been implemented. This raises questions as to whether or not PhD theses from our public universities are addressing the natural resource and environmental challenges the country faces. We believe that it is therefore important to understand whether and how PhD theses on Ghana have been utilized especially in the field of natural and environmental sciences and management.

### **Problem statement and focus**

The University of Ghana (UG) adopted the following mission statement in 2001: 'Our mission is to develop world-class human resources and capabilities to meet national development needs and global challenges, through quality learning, research and knowledge dissemination' (UG, 2001). Similarly, the mission of Kwame Nkrumah University of Science and Technology (KNUST) is 'to provide an environment for teaching, research and entrepreneurship training in science and technology for the industrial and socio-economic development of Ghana and Africa' (KNUST, 2001)

To achieve their aims, missions and functions and to improve upon their ranking in the world, universities in Ghana took decisions to steadily increase their postgraduate enrolments (Gyekye, 2002). One field which increased its doctoral enrolment over the years is the natural and environmental science. Again, the increase in enrolment in these fields can be attributed to the fact that admission is open to candidates from various disciplines ranging from the sciences to the social sciences.

Arising from the above and the multidisciplinary content of doctoral programmes in the field of natural and environmental sciences; doctoral admissions in the field have steadily increased in the last twelve (12) years in the two major universities in Ghana as they admit candidates with backgrounds from the social sciences, natural and physical sciences and engineering (UG, 2012; and KNUST 2013). Lastly, the availability of standardized laboratory to carry out experiments and availability of academic supervisor are reasons for the increase in enrolment.

In addition, issues concerning environment and natural resources management are at the forefront in Ghana and Africa in general (Benneh *at al*, 1996; and United Nations,2015). Generally, with the current national emphasis on returning to a low-carbon emission economy, the above reasons have also created jobs in those fields for graduates.

Ghana is faced with some environmental and natural resources management problems such as waste management; deforestation and air and water pollution; land and water degradation. These areas have been well researched at the PhD level. But the utilization of knowledge from doctoral theses to the general body of knowledge which already exist has not been well studied (Gyekye, 2005; Manuh, Budu and Sulley, 2002; Nerad and Heggeland, 2008).

The core research question of the proposed study, thus, is: To what extent have the PhD theses produced by Ghanaians in the field of ENRS been taken up by the authors themselves and other research end users to utilize the findings and recommendation to tackle environmental and natural resources challenges faced by the country?

## **Goals and research questions**

### **Overarching goal**

The overarching aim of the study is to investigate the extent and nature of the uptake PhD research conducted in Ghana, to the environmental and natural resources challenges in Ghana and specifically as it relates to national policy formulation and implementation.

### **Specific research objectives**

The specific research objectives of the study are:

1. To evaluate the overall relevance and value of doctoral studies in the field of natural and environmental sciences in Ghana;
2. To investigate the extent to which doctoral research outcomes are recognized by scholars, scientists and policy makers;



3. To study the mechanisms of knowledge dissemination, uptake and influence of such doctoral research in Ghana over the past 15 years; and
4. To make recommendations on the research direction universities could focus on in the next decade in environmental and natural resources that would have positive development impact on Ghana and Africa.

### **Research design and data collection**

The study was a descriptive study which integrated different methods including content analysis of completed theses, a Curriculum Vitae (CV)-analysis of the authors, bibliometric studies of any publications that ensued from the doctoral theses and finally in-depth interviews with key informants. The CV analysis (which by now is an established methodology) was conducted of authors of the selected theses used for the study to analyze their experiences and utilization of knowledge of national policy in their field before and after doctoral studies. In addition, bibliometric analysis (including citation analysis) of the articles that were produced as a result of their doctoral studies was undertaken.

The study commenced with downloading the relevant theses from online sources. Visits were also made to libraries of selected faculties and departmental libraries in the University of Ghana and the Kwame Nkrumah University of Science and Technology to collect information on PhD theses produced from departments which run courses related to natural and environmental science and management. After the final theses were selected, a content analysis was undertaken by entering the needed information including the objectives, summary of findings, conclusions and recommendation of the theses in Microsoft Access.

The second phase of the study identified the authors of these theses. The theses authors were contacted and requested to send their CVs to the student. Once these CVs were received, standard CV analysis techniques (e.g. Barry Bozeman) were used to do a proper analysis of the careers of these individuals prior and since receiving their doctoral degrees.

The third phase of the study consisted of a detailed bibliometric analysis of any publications (both in the scientific and popular literature) listed in the CVs of the individuals concerned.

The final phase of the study involved in-depth and semi-structured interviews with those individuals who responded to our letter of cooperation sent to them and who had agreed to participate in the study.

## **Data analysis**

The interviews were recorded and fully transcribed for the purpose of analysis. The transcribed interviews were coded using standard qualitative data-analysis software (Atlas.ti).

## **Provisional chapter layout**

Chapter 1 of the thesis report will focus on the shift in missions and visions of African Universities (including research Institutions) whilst the chapter 2 discusses Africa and the world class universities status. Sections of the chapter 2 presents the origin of WCU and also arguments in favour of WCU's in Africa. Chapter 3 reviews and discusses the relevant literature on discuss in relation to the field of ENRS; which post-graduate programmes are offered in the field of ENRS as well as some features of the knowledge produced in this field. The last section of the chapter three presents a Bibliometric Analysis of ENRS Research in Ghana: 2000 –2015. Chapter 4 presents the different methodologies followed in the study (content analysis of theses, CV-analysis, bibliometric analysis and qualitative analyses of interviews conducted).

The final chapters 5, 6, 7, and 8 present the results of the study and discuss the results present recommendations and conclusions of the entire study. The discussions of the results are compared with earlier work done by scholars in the field of higher education, doctoral studies, research uptake and utilisation, and the field of environmental and natural science.

Chapter 9 presents a summary of the findings and draws conclusions based on the findings of the study. Recommendations are made to relevant stakeholders to help improve on the uptake of doctoral thesis findings.

## CHAPTER 1

### THE CHANGE IN THE MISSION OF AFRICAN UNIVERSITIES

#### 1.1 Introduction

Universities in Africa were established in the 1940s with a core mission of teaching and research. However, years after their establishment, teaching alone seems to be the core mission and activity of these universities. The research mission of these universities has recently entered into the broader debate of the function of African universities. The debate has focused on the uptake of research from universities in Africa, among other things. To present convincing arguments about the problems of research uptake in African universities, it is first necessary to understand their research missions and visions, and when research became part of the broader debate, and also to have a background of how these universities were established. Finally, to understand the changing missions of universities in Africa, it is necessary to explore (both historically and in the present) the notions, missions and visions underlying the establishment of African universities.

The first part of this chapter will be devoted to a discussion of the efforts the British government made to establish university colleges in British colonial Africa. The various commissions and educational advisory bodies set up during the period 1841 to 1948 (i.e. when the Asquith Colleges were established in British colonial Africa) will be discussed. The focus of the discussions will be on the official mandates, reports and key conclusions and recommendations of the various commissions and educational advisory bodies.

The historical trends and the various perspectives of academics and politicians on why universities were established in Africa will be discussed in the subsequent section. The following section will discuss the changes which occurred during the British colonial era in universities in Africa (with regards to nationalism, flagship institutions, and the vocational/entrepreneurial and research aspects). The change in missions and perceived roles of universities in Africa since the late 1990s will also be discussed. The second part of this chapter will be dedicated to a discussion of universities in Ghana: their history and missions when they were established in Ghana are discussed, and whether there has been a shift in their missions; and whether any such shift follows similar trajectories to that of other African universities. The chapter closes with discussions of the current research mandate of Ghanaian universities.

The main objectives of this chapter are to identify:

1. the original mission and role underpinning the establishment of university colleges in British colonial Africa;
2. whether there have been changes in the missions of African universities over the years;
3. if Ghanaian universities have also changed their original missions; and
4. whether the changes in missions of Ghanaian universities followed a similar trajectory to that of other African universities.

## **1.2 Historical Perspectives on the Mission for Establishing Universities in Africa**

This section of the chapter will discuss the efforts of the British colonial government in creating universities in Africa. The various commissions formed by the colonial office between 1845 till 1948 (when the first universities colleges were established in British colonial Africa) are discussed. Particularly, the Prof H.J Channon Commission Report, which first raised the role of research in any future university in Africa and other British colonies in Asia will be singled out and discussed thoroughly since it fits into the broader context of this thesis. This Commission was the point at which research entered the broader debate of the missions of future universities in Africa.

In addition, the section discusses the different views academics have on historical accounts of the notions and missions behind the establishment of universities in Africa. I argue that universities in Africa have gone through several phases in their development and that each phase of the universities' development is described by the concept (or agenda) being pushed by stakeholders. African universities have been described or conceptualised as national universities; developmental universities; teaching and vocational universities, as well as research universities. The major conferences organized between 1961 and 2000 to discuss the missions of African universities will also be discussed. I argue that all these conferences discussed different missions for African universities.

### **1.2.1 Education Commissions in British African Colonies (1845 – 1948)**

According to Lulat (2005), the role of the British colonial policy between 1800 and the 1920s needs to be recognised in the life histories of higher education (HE) institutions in Africa. The creation of a system of HE in British colonies in West Africa started with the provision of secondary-level education (and in some cases even primary education), then, they added university-level classes, which functioned as hybrid institutions providing both pre-university and university education. Later on, as alternative secondary school-level institutions emerged,

they shed their pre-university-level classes which then evolved into full institutions of higher learning.

During the 19<sup>th</sup> century, a number of HE institutions were established. Among the first institutions of HE to be established in Africa during the 19th century were the Fourah Bay College in Freetown (1826); the Gordon Memorial College in Khartoum (1898); Lovedale Institution in South Africa (1841); the South African College in Cape Town (1829); the University of the Cape of Good Hope (1873); and Victoria College in Stellenbosch (1887). Like most other HE institutions in British colonial Africa, Fourah Bay was founded for the purpose of providing theological training through initiatives of Christian missionaries (Mwira, 1992; Wagaw, 2002). Their motives for establishing Fourah Bay were similar to those of other missionaries working elsewhere in colonial Africa in that they saw it as a logical extension of their involvement in formal education.

There is some historical irony regarding graduates of Christian-missionary educational institutions who would, in time, emerge to severely criticise, perhaps ungratefully, the very education that they had received from the missionaries (Carte, 1964; Yedelman, 1975). “*The missionaries, of course, never anticipated the six of the Pandora’s Box that they helped open through their evangelical determined educational efforts.*” Thus, some (like Horton and Blyden) among these early members of the African educated elite argued that what was really needed was a secular West African university that would go beyond the confines of missionary-orientated education, which they felt was narrow, intellectually stifling, and dogmatic (Ashby, 1966). Instead this group called for a government-funded, world-class, secular HE that celebrated the intrinsic superiority of African culture (as some of them suggested) in secular circles, and that could directly respond to the dictates of the political, economic and social development of West Africa.

In the view of John Pope Hennessy, a West African university in 1865 would not only provide higher-education opportunities for both the children of the rich and the talented poor in West Africa, but would also help to shield West Africans from the morally corrupting influences inherent in countries overseas (Ashby, 1966).

However, to the greatest disappointment of Horton, Blyden and others (who were trained at Fourah Bay College) who shared their views on the newly reformed Fourah Bay College, the institution did not even remotely approach their cherished dream of a secular and prestigious institution but had rather “Africanized” the West African university (Lulat, 2005). The curriculum did not include any of the fields of study that the nationalist group had proposed; neither African

studies, agriculture, architecture, economics, engineering, law, medicine nor science were included.

The above situation consequently led to the nationalists turning their energies towards the idea of private sponsorship for HE. However, nothing would come of that strategy for a long time either (Ashby, 1966; Janus, 1980; Nwauwa, 1996).

To meet the nationalist demand for HE and the call for change in educational policy in British colonial Africa, the British Secretary for the colonies began to take the necessary steps to explore the possibility of establishing HE institutions in Africa. The colonial government set up various commissions and an advisory body to explore and advise the United Kingdom government on the need for HE in Africa.

Among the commissions and advisory bodies established during the colonial era, the following are central to this study: the Madden Commission (1841); the Advisory Committee on Education in the British colonies (set up in 1923); the Phelps-Stokes Commission to East Africa (1922); the Currie Subcommittee (1933); De La Ware Commission (1937); the Channon Subcommittee (1943); the Elliot Commission (June 1945); and the Asquith Commission (1945). The work of these commissions mainly focussed on the British colonies in Africa.

The first official kind of effort to investigate the state of educational provision in the colonies, according to Lyons (1970), took place through the agency of Dr Richard R. Madden. Madden was sent to West Africa as a Royal Commissioner broadly charged with a survey of the political, economic and other conditions in the settlement of Gambia, Sierra Leone and the Gold Coast. In Madden's report, submitted in 1841, he indicated the basis of flimsiest evidence, that the African child's learning capacity atrophied significantly as he/she grew up the educational ladder, as compared to that of an European child, and declared them intellectually inferior. His recommendation was that the schooling of the African should be aimed at teaching non-intellectual pursuits, specifically vocational training; anything else he said would be a waste of time (Lulat, 2005).

Madden's basic message was that Western education should be adapted to the special circumstances of the African, and this viewpoint would be reiterated in different guises as years went by and would eventually become part of official educational policy for a time, but for different reasons: political and economic, rather than intellectual.

The Madden Commission did not see the need for HE in West Africa. During that period in history most the colonies did not even have a high school or a college; it was therefore somewhat justified in making such a recommendation.

The report on the state of education in British colonial Africa of the United States missionary-instigated commission, the Phelps-Stokes Commission to West Africa, authored by Dr. Jesse Jones, was published in 1922 and was released at a period when:

1. There was perennial demand for education from a number of Africans themselves (In the 1920s the call would later be taken up by nationalists like J.E. Casley Hayford, the founder of the National Congress of British West Africa); and
2. The increasingly clearer recognition in the corridors of Whitehall that colonial domination should gradually be replaced with “trusteeship” – a concept that had emerged from European politics.

Germany also prompted the British colonial government to set up a permanent advisory committee in 1923, which was later known as the Advisory Committee on Education in the colonies.

After years of work by the Advisory Committee, whose decisions had largely been informed by the Phelps-Stokes Commission to West Africa, the British government became formally and actively involved with the development of policy on education in colonial Africa.

Brown (1964) summarised the recommendations of the Advisory Committee on Education’s report on the educational role of the British government:

1. To supplement, and not to compete with the existing missionary educational effort;
2. To extend the benefits of basic literacy to as many people as resources would permit;
3. To provide training for the development of a cadre of low-level government officials (such as office clerks, interpreters, messengers among others);
4. To provide vocational educational opportunities; and
5. To permit the development of some level of HE, especially in areas such as teaching, agricultural, veterinary, and paramedical trainings.

The Advisory Committee on Education report was the first British education policy adopted in West Africa. It should be noted that it was not until the submission of the Advisory Committee Report that the need for HE in West Africa was recognised.

The decision of the Advisory Committee to the British government to set up “some form of HE” in West Africa was mainly and largely determined by the Phelps-Stokes Commission (which itself had evolved from efforts to educate the fairly recently emancipated African Americans).

According to Lalut (2005), it was not that the earlier commissions and missionaries were opposed to any form of HE per se, but rather they did not see it as a priority, and certainly they expected any development of HE in British colonial Africa to be restricted to the Tuskegee-type of HE, considered to be well-adapted to the minds and circumstances of black peoples everywhere.

Within a decade after the submission and adoption of the Advisory Committee’s report (in 1933), there were ever-increasing nationalist agitations for independence in India and in some parts of West Africa. Among issues of economic and social transformation, the British began to adopt a more realistic view towards deepening Africans’ thirst for university-level HE. HE was essential for the development of a cadre of indigenous leadership who, when the time was ripe, could take over the reins of government in the various British colonies, while still maintaining ties to Britain. Moreover, the British were also very concerned about the fact that Africans had been going overseas for HE (to Europe and North America) on their own initiative, with the very real danger of coming back “contaminated” with inappropriate, radical intellectual ideas such as Pan-Africanism and Bolshevism (Furley & Watson, 1978). In fact, the Phelps-Stokes Commission had already begun to sound warning bells in this regard. It noted in its second report on education in Africa:

The demand for (higher) education cannot long be delayed. Already a few Native pupils requiring special training for technical, agriculture or teaching service, as well as those who desire to enter the professions, have gone to Europe or America to continue their education. The necessity to do this is a serious handicap to Native Africans who have the capacity for advancement. The cost is almost prohibitive, the break from all African surroundings is unfortunate, and the entrance into perplexing and conflicting tides of European or American life is fraught with danger to mind and morals (Jones, 1925 pp 44).

For reasons specific to the circumstances of a particular colony (which could range anywhere from the need for clerical personnel, to African demands, to the presence of enlightened colonial administration) a number of HE institutions were established in Anglophone Africa in the 1920s and 1930s. These institutions included the Achimota College (1924), the Kitchener Memorial School of Medicine in Sudan (1924), Government College at Ibadan in Nigeria (1929) and Higher College at Yaba, Nigeria.



The principal purpose of establishing the Higher College at Yaba was to provide sub-degree-level training (though government officials had voiced expectations that sometime in the future it would develop towards granting degree-level qualifications in association with a British university). However, unlike Yaba, Achimota College did not simply provide teacher training and HE, but it also offered kindergarten, primary-level and secondary-level education – all from one site (Foster, 1965; Janus, 1980). Achimota College was then left with three divisions; a secondary school, the teacher training component, and what it called the university department (the HE wing of the college). The university curriculum rested on the preparation of students for the external exams of the University of London at both the intermediate-level (roughly equivalent to junior-level studies at US universities) and at the degree-level. Specifically, students had a choice of intermediate science, intermediate engineering, B.Sc. engineering, and intermediate science (economics).

This university-type model being practiced at Achimota College and the other colleges did not by any means constitute a real university. In fact, courses read at the university wing were in some cases for advanced-level examination. Against the backdrop of starting Achimota College and other higher colleges in British colonies, a subcommittee was appointed by the Advisory Committee, under the leadership of Sir Currie, to look into the matter of HE provision in British colonial Africa. The Currie Commission issued its report in December 1933 (although the report was never published) and Lulat (2003) asserts that on specific recommendations on the development of HE in colonies, “the Currie report did not mince any words”:

The present position, as we see it, is that, while the colleges at Achimota, Makerere, Yaba, and Khartoum do not yet as whole approach a real university standard, inevitably and of their own momentum they tend towards this final report. At the same time the African thirst for HE remains unabated; if this is not satisfied at home it can only lead to an influx of undergraduate African students towards the Universities of Europe and America. The social and intellectual undesirability of this procedure in the African’s own interest needs no labouring here..... (Lulat, 2003:221)

The report continues that:

... there is a grave danger, as we see it, of the Africans’ zeal for education being neglected and ignored by the Government to whom they ought to be able to look for its reasonable satisfaction.

The Currie Commission’s report concluded that from:

... these considerations is that the only right policy for government is to think out ahead a scheme of developing selected institutions in Africa up to a real university standard, and that this policy, as soon as decided upon, should be publicly announced as officially

adopted. We are of the opinion that such a university must almost necessarily proceed through the same stages by which the university colleges in England have gained university rank (Ashby, 1966:480).

According to Ashby, (1966) the Currie Commission fully endorsed the extant policy first propounded by Phelps-Stokes Commission, that HE in Africa should be orientated towards technical and vocational training and not a liberal academic education of the type that African essentialist's like James Africanus and Beale Horton had called for.

If the Currie Report had seen the light of day, it would have turned out to be a seminal document, however, this was not to be. Ashby (1966:481) observes that "... Not only was the report not published, but in fact it was forgotten". This was because the recommendations of the report had run foul of the colonial governments among whom the colonial office had circulated the report for comments - especially in West Africa where they did not perceive any urgent need for HE. In 1936, the Secretary of State for the British Colonies appointed a commission under Earl De La Warr to report on the development of HE in East Africa. Unlike the Currie subcommittee, the De la Warr Commission was concerned specifically with the issue of upgrading the institutional status of just one institution, Makerere College in Uganda, into a university college and in time, a full university.

The De la Warr Commission, or the Commission on HE in East Africa, was guided by three terms of reference, which were stated as follows:

1. To examine and report upon the organization and working of Makerere College and of the institutions or other agencies for advanced vocational training connected with it in relation to (i) the society which they were intended to serve, and (ii) the educational systems of the territories from which the students are drawn;
2. To make recommendations for the development and administrative control of Makerere College and its allied institutions; and
3. In making such recommendations to consider: (i) the effect of the development of the College upon the educational organization of the territories concerned; (ii) the general interest and needs of the communities from which students are, or may in future be drawn, and (iii) the educational needs of women (De la Warr Commission Report, 1937: p5).

The De La Warr Report issued in 1937 (a year after the Currie Report) also suggested a change in policy in the creation of a HE system in Africa; it was the first report to publicly articulate British colonial policy on HE. The Commission wholehearted recommended that

Makerere College be raised to the level of a university college with institutional affiliation to the University of London. It was the first time public indication of the direction in which the winds of British colonial HE policy were now blowing. At the point when this report was published, it was clearly and publicly acknowledged that the aspiration of Africans for a secular university-level education would be foundational to policy. Moreover, the Commissions' advocacy of some degree of Africanization of university curricula, especially the arts, suggested considerable enlightened sensitivity to the local environment.

In the De La Warr Report, and the other earlier reports, the focus of establishing HE in Africa was to train the human capital required for development. However, the need for research in African HE was not mentioned in any of the earlier reports until the Channon Report of 1943. Professor H.J Channon's Report was based on his earlier confidential memorandum on "Some observations on the development of HE in the Colonies", sent to the Educational Advisory Committee and the subsequent work done by the subcommittee appointed by the colonial government. He had played a leading role in the educational commission which had gone out to Malaya in 1938, and from the time of his appointment to the Advisory Committee in 1940, he increasingly dominated its discussions on HE. He stepped into the role that Sir James Curie had played until his death.

The Channon Report clearly called for an approach to HE in the British colonies that was genuinely university-orientated and not orientated primarily towards vocational training. Moreover, the Report suggested that the dependence on externally awarded degrees was not in the best (long-term) interests of the colonies because it stunted efforts towards the indigenization of HE.

The Report stated that "each of these universities must therefore be indigenous and must not be subject to some arbitrary pattern introduced from Great Britain. Apart from providing the customary facilities for professional study, these universities must be designed to fructify native cultural possibilities, and to study problems in their local, rather than in their foreign forms" (Ashby, 1966:493).

According to historical reconstruction of the various Commissions' events, the Channon Report (1943) was the first time that an external commission would come out so strongly in favour of identifying research as one of the mission of these colleges and in addition as a future mission of African universities.

To Lulat (2005), the Channon Report raised an issue that is still of considerable relevance today in Africa: the matter of research as an integral part of the mission of the African university. The Channon Report stated that:

... We consider it as highly important that research should come to be regarded as being of no less importance than teaching in the life of the colleges. Unless steps are taken greatly to broaden their life, the colleges will certainly fail to achieve the objective of becoming the intellectual centres of their territories.

The report goes on to emphasise the absolute necessity of “ensuring that the present divorce of research from teaching is not perpetuated” (Channon Report, 1943).

In Channon’s Memorandum published in 1940, he stressed on the importance of research work in universities. He notes that, the importance of research in universities has not been understood and asserts that research was seen as a luxury, unjustifiably expensive both in time and money, unless it was directed to the solution of a problem, the results which are of immediate practical application. This attitude towards research by the colonial government provided yet another factor calculated to prevent universities from achieving their purpose.

In addition, it was not realised that immediate public utility is not, and cannot be the standard by which universities measure the value of the research they conduct, nor is it understood that teaching in any university institution becomes sterile, unless the inspiration of the teacher is maintained by some form of original investigation.

Professor Channon believed that university lecturers should undertake some original investigation from time to time and that this would influence their teaching and the transfer of knowledge to their students and the community. This still relevant for our universities because there are new forms of knowledge in all fields emerging every day, and until the teacher undertakes some form of original investigation, he or she will be imparting “old” knowledge to students.

In the final report submitted by Channon in 1943, he notes that research in the colonies had also been mainly the concern of the various government services, such as those of medicine and agriculture, and had been mainly directed to finding solutions to problems of immediate practical importance.

In addition, historical reasons account in part for the fact that research in the colonies had thus far been almost entirely confined to work carried out by government departments or other

bodies. As a result, it can be said that research played almost no part in the life of the colleges as teaching institutions. This divorce of research from the colleges may be in part explained by the fact that the governments' services existed before the colleges were established; the notion therefore arose that research would be expensive, because it required extra staff, laboratory- and library facilities, and additional financial provision would have to be made.

There is no doubt that the colleges will not achieve this objective if their activities are unduly concentrated on teaching, as the history of university development in India shows. It is therefore vitally important that research plays an important part in the life of colleges from the very start. The argument that colleges can spend their earlier years in teaching only and that research can come later is misleading and a practice that is difficult to change later on. Apart from this, there are urgent intellectual and material needs for research of all kinds in the largely unexplored colonial fields to be encouraged.

Furthermore, like the wider results of university education as a whole, the value of academic research cannot be assessed in immediate material terms, as many problems of applied nature cannot be solved until pure research has added to existing fundamental knowledge. Although there is a need for urgent problems to be investigated, immediate public utility is not and cannot be the only standard by which university research is measured.

In dealing with the problem of research within the colleges of the colonies, the Channon Committee recommended that the Colonial Research Committee should provide funds for extensive research development in the colonies.

The Subcommittee headed by Professor Channon considered it very important that research should be regarded of equal importance to teaching in the colleges. The report stated that unless steps were taken to broaden the scope of the colleges, they would certainly fail to achieve their objective of becoming the intellectual centres of their territories. To Lulat (2003) the Channon Commission mentioned that the encouragement of research within the colleges must obviously not be allowed to hinder its further development in other institutions. On the other hand, it is equally important that the present backwardness of the colleges in research should be regarded as a reason for yet further concentration of research in existing institutions; it should be regarded as an incentive to taking vigorous steps towards making up the present leeway of the colleges and to ensuring that the present divorce of research from teaching is perpetuated.

Professor Channon suggested that just as in Great Britain, the terms of appointment of members of academic staff should include both carrying out research and teaching. The inclusion of research in the terms of appointment obviously imply that both the facilities and staff complement are of such standing as to ensure that research is possible.

In addition, the Subcommittee recommended that, when men are sent out from Great Britain for the purpose of carrying out special research in the colonies, their activities should not be limited to their research only. It would be to the greater gain of the colleges if such men could give a short course of lectures or seminars each year on their own special subject. This would provide great interest and stimulation both to the students and to the staff, and in most cases, the opportunity to give these lectures would be welcomed by the researcher as well.

The Channon Commission even suggested the type of research that the colleges needed to undertake. It notes that much of the research that was urgently needed in the colonies was of the regional type, and included such things as nutritional surveys and work in the social sciences. Additionally, it was highly desirable that the colleges should act as the headquarters of workers involved in these fields, for the same reasons as have just been discussed, and that the existing exclusion of the colleges from research work carried out by government departments should not continue. If research was done in the colleges, it would obviously be of great gain to the workers in these departments to be in contact with the colleges; similarly, the colleges would greatly benefit from the occasional exchange of staff for short periods.

The Channon Committee Report was very exhaustive and touched extensively on the need for colleges to undertake research in order for them to be centres of excellence. Subsequent commissions also considered research as an important mission of any future universities in Africa.

It thus took more than half a century for the British colonial government to come around to accepting an educational policy on HE which the West African essentialists had advocated decades earlier.

However, the implementation of the changes in HE policy recommended by the Commissions (from Maddens to Channon) would have to endure the passage of the Great depression of 1930s and the Second World War (1939 -1945) - two cataclysmic events that temporarily froze the implementation of any major new colonial policies.

At the end of the Second World War, the need for the establishment of universities in Africa by the British colonial government had been realised. The British colonial secretary appointed two HE commissions in 1943, the Elliot Commission and the Asquith Commission in response to the now generally accepted view among the British ruling circles that independence in the British colonies was simply a matter of time, and that when independence came to the colonies, the indigenization of the government civil service and so on would all create a demand for trained leadership and manpower (human capital).

The Elliot Commission was tasked with producing a report on the state of HE in West Africa and making recommendations. The Commission's report was published in June 1945, following their three months' study tour of British West Africa (Ghana, Gambia, Nigeria and Sierra Leone) they fully endorsed the development of HE in British West Africa on the basis of the existing three institutions (Fourah Bay, Yaba and Achimota).

However, what is interesting about the report is that it was divided into two reports: one by the majority and the other by minority Commission members. The bone of contention was the question of establishing a single, federated, West African university college (favoured by the minority) versus separate national university colleges. The majority view was that the state of economic and political development of West Africa at that time was such that it merited the creation of independent university colleges in the three largest of the British colonies (Ghana, Nigeria and Sierra Leone).

The minority view favoured a single West African university college with the three existing colleges evolving towards the status of territorial colleges - that is tributary preparatory colleges that would funnel students to the single regional college. Their view was that each country would then subsequently have a flagship national university.

Essentially, the arguments of both groups rested on four factors:

1. Only the concentration of resources in a single institution would permit the acceleration of time from decades to years (in terms of developing a world-class research university)
2. There were not sufficient students with the appropriate entrance qualifications (in terms of pursuing senior and graduate level studies) available to fill all the places at the three planned university colleges (in light of the insufficiently developed secondary-education facilities);

3. There were insufficient resources available (in terms of finance, faculty, staff, buildings, libraries, laboratories and equipment); and
4. The curricula (in terms of fields of study), coupled with research programmes, would not be comprehensive enough to meet the development needs of the entire region.

On the fourth point, Carte (1964) asserted that the minority member of the Commission criticised, for example, the recommendation by the majority that Fourah Bay College continued to concentrate (under its existing management of the church missionary society) only in the arts and theology, with the sciences being added slowly, and much later on in the future.

The minority wanted the creation of a truly first-class university college as soon as possible that would not only offer comprehensive curricula and research facilities, but would also address the all-important issue of academic quality.

The majority, which was made up mostly of West Africans (including K.A. Korsah, I.O. Ransome Kuti and A.E. Trueman) except the chairman (who was not a West African) were people with nationalistic agenda. These West Africans did not see the need for any new universities in the colonies to be worried about issues of teaching and research quality. To the West Africans on the majority side, all that was needed were universities in their countries.

Given the economic conditions of British West Africa in 1945, well described by the Commission itself in the first part of the report, the minority's criticisms were well founded. However, in the end, politics (national rivalries among the West Africans) triumphed over the concern for speed, rationality, comprehensiveness and quality (Janus, 1980; Carr-Saunders, 1961; Maxwell, 1980).

Lulat (2005) concludes that had the majority gone along with the minority, it is possible that West Africa could have forged a path that other regions on the continent could have later emulated; that even under severe resource constraints, it is still possible to develop, by means of rational concentration of resources, a truly comprehensive, relevant, first-rate, research university serving the needs of an entire region, without regard to national boundaries/rivalries, and at the same time to withstand economic vicissitudes. If the above had happened, it would have increased the research capacity of African universities and made them stand out as equals with other universities in Europe and the Americas.

The Elliot Commission report also predicted some of the future challenges the African university would have to grapple with in years to come. These problems were put into four main categories:



The first was academic standards. The Commission observed that:

... academic standards alone do not make a university. A university is a community whose purpose is the advancement and dissemination of knowledge and that insofar as the passing of examination is the main object of the student, then the university has fail in its purpose; insofar as learning is pursued for learning's sake it succeeds. The attainment of this ideal calls for a cooperative effort by both teachers and those taught. (Elliot Commission 1943: p141)

The second was about research. The Commission reiterated the sentiments expressed by Channon:

... We have all through our Report stressed the importance of research. We stress it again here in the conviction that the first essential to progress towards full university status is the selection of a first-rate teaching staff who will not only inspire their pupils but will themselves be constantly contributing to the advancement of knowledge. (Elliot Commission 1943: pp122).

The third problem the Commission foresaw was to do with community service. On that the Commission noted that:

... We have repeatedly stated our belief that university institutions in West Africa can and should have an active influence beyond the immediate university circle of staff and students. University education is not and cannot be a thing detached from the community... We cannot lay down in details the lines of such development in West Africa: the university institutions will themselves have to find out ways in which they can serve their own communities and the communities which lie beyond their borders. (Elliot Commission 1943: pp 121).

The final category was on the contradictions of developing HE in a non-literate society. The Commission stated that

To suggest that university standards can only be based on universal popular education is to ignore the whole history of universities themselves. The great scholars of earlier centuries were not the product of a universal literacy in every artisan's or peasant's hut. It was the reverse. The education of the many was made possible by the prolonged and intense study of the few. West Africa is in an epoch of its own. Total illiteracy and high standards of learning will exist side by side for many years to come. (Elliot Commission 1943: pp123).

According to Carte (1964) and Ashby (1966) the problems predicted by the Elliot Commission that African universities would have to face in the future emerged as a consequence of the British experience with HE in colonial India. They were particularly concerned about learning

lessons from that experience (which had left them with a bad taste in their mouths - chief among them being the proliferation of poor quality institutions that in time became hotbeds of nationalist agitation).

The Asquith Commission was set up after the Elliot Commission with its official mandate:

... To consider the principles which should guide the promotion of HE, learning and research and the development of universities in the colonies: and to explore means whereby universities and other appropriate bodies in the United Kingdom may be able to cooperate with institutions of HE in the colonies in order to give effect to these principles (United Kingdom Colonies Report, 1945).

In addition, a major guiding principle of the Commission was not to repeat the “Yaba mistake”, which was the provision of university-type education but without it being certified as such. The Commission knew that whatever policies it came up with had to speak to the African desire for a true “world-class” HE (Janus, 1980). The Commission issued its report in June 1945.

The Commission ended up proposing the establishment of university colleges - that is, institutions with affiliation to the universities in Britain in the tradition of the Fourah Bay College - in all the British colonies (not just those in Africa), in line with the ideas that had been formulated by Curie, De La Warr, Channon and Elliot (Janus, 1980).

According to the United Kingdom colonies Report (1945) and Lulat, 2005, the compromise the Asquith Commission reached was explained in the report in the following manner: “while the establishment of universities in the colonies was urgent, the first step towards this goal was the founding of university colleges and not full universities”. The reason being that; the Commission felt that to give degree-granting status to a newly established institution of higher learning was premature because in its words, “... An institution with the status of a university which does not command the respect of other universities brings no credit to the community it serves.” The report then went further to conclude: “We cannot say how long the university college stage will last, because the length of this period depends upon much that cannot be foreseen (United Kingdom colonies Report, 1945: pp149).

The Asquith Colleges were set up shortly after the publication of the Commission’s report through the agency of a remarkable combination of British government finance (facilitated by the Colonial Development and Welfare Acts of 1940 and 1950), and British university expertise in the form of Inter-University Council for HE in the Colonies - established in 1946 as an implementation of the recommendations of the Asquith Commission.

The Asquith Colleges include: The University College of Ghana (at Legon, opened in October 1948); University College of Sierra Leone (established by upgrading the existing Fourah Bay College in 1960); The University College at Ibadan (opened in 1947); Khartoum University College (created in 1949 by merging the existing Gordon Memorial College and the Kitchener Medical School); Makerere College (upgraded in 1949); the Royal Technical College at Nairobi (founded in 1951); and the segregated University College of Salisbury (established in 1953, but upgraded two years later to become the University College of Rhodesia and Nyasaland with affiliation to the University of London) (Janus, 1980).

It has clearly been established that on the eve of independence in most of British colonial Africa, some form of HE at the university level was now evident, and, as Ashby (1966) asserts, it was a university level education that was comparable in terms of rigor and quality to that of the metropole.

The various commissions tasked to advise the colonial government on the need to establish universities in Africa contributed the establishment of colleges in the colonies. However, the terms of reference given to the commissions before the Channon Commission did not have research as part of the mandates and they also did not see the need for any future university in British West Africa to have a research mission as part of its overall mission. The Channon Commission did a good thing by introducing the need for universities to carry out research as part of their core function into the broader debate. Research thus became part of the mission of the universities which were later established, as the later commissions encouraged the colonial government to accept and add research as part of the core function of any future university (ies) in the colonies.

### **1.2.2 History of University education in Gold Coast**

The history of university education in the Gold Coast, now Ghana, is the history of education commissions (Daniel, 1996; Bening, 2005). Daniel (1996) and Bening (2005) assert that these commissions were established every few years, beginning with the Asquith Commission appointed by the Government of the United Kingdom in August 1943.

This Commission was to:

... Consider the principles which should guide the promotion of HE, learning and research and the development of universities in the colonies; and to explore means whereby universities and other appropriate bodies in the UK may be able to cooperate with institutions of HE in the colonies in order to give effect to these principles (The Commonwealth Universities Year Book 1998; pp 649).

The Asquith Commission identified centres around the colonies already engaged in university-type programmes of study including Achimota College (established in 1924), where according to the Commission's report of 3 May 1945, "students are accepted in the college for the courses leading to the following examinations of the University of London- Intermediate Arts, Intermediate Science, Intermediate Engineering, BSc (Engineering), Intermediate Science (Economics)" (Daniels, 1996; Effah, 2003; and Bening 2005).

The Commission's report included also the following recommendation:

In the interest of HE in the colonies it is essential that there should be established as early a date as possible universities in those areas which are not now served by an existing university. The immediate objective is to produce men and women who have the standards of public service and capacity for leadership which the progress of self-government demands, and to assist in satisfying the need for persons with the professional qualification required for the economic and social development of the colonies. (Asquith Commission, 1943)

The recommendation made by the Commission pointed to the teaching mission rather than any research mission of African universities. Universities were expected to teach and produce graduates like economist, doctors, philosophers, accountants among others who had less to do with research.

In the view of Asquith, the immediate objective and function of the universities in the Gold Coast should be to teach and not conduct research. This was because Ghana needed qualified people to run the government ministries and departments after independence. The research mission of the colleges established would have to wait until the required manpower was generated for the country.

The university college in its first decade focussed on its teaching mission more than its research mission. It trained a lot of manpower for the government, industry and service sectors. The years after the creation of the Gold Coast College saw the government of Ghana creating additional HE institutions to meet the growing demand.

### **1.3 Ghana's System of HE**

Ghana's system of formal HE originated in 1948 with the establishment of the University College of the Gold Coast as a college of the University of London, to offer programmes in the humanities, arts, sciences and agriculture. It was followed by the Kumasi College of Technology in 1952, with a mandate to undertake programmes in science and technology.

After the attainment of independence, both institutions were upgraded to full university status in 1961. In 1962, the University College of Cape Coast was established to provide specialized training for teachers of science and mathematics for the secondary and technical schools.

The University of Ghana was founded as the University College of the Gold Coast by Ordinance on August 11, 1948 for the purpose of providing and promoting university education, learning and research. The University of Ghana was established by the University of Ghana Act, 1961 (ACT 79). The Kwame Nkrumah University of Science and Technology, Kumasi was established by an Act of Parliament Act, (ACT 80) 1961 and aimed to provide HE, to undertake research, to disseminate knowledge and to foster relationships with outside persons and bodies (Daniels, 1996; Benneh, 2002; Effah, 2003).

It was not until 1992 that two more publicly funded universities were established: The University for Development Studies (UDS) in Northern Ghana, and the University of Education, Winneba (UEW) in the Central Region of Ghana. The mandate of the UDS was to adopt a practical, action-orientated approach to education and to help address community problems. The UEW had the mandate of producing professional teachers for the pre-tertiary levels of education.

These institutions continue to form the core of the HE system in Ghana. They train the needed manpower for the service sector and industries.

It is clear from the discussion above that, the notions and mission of creating universities in Ghana included the research mission. Universities were expected to understand research and make their findings available to the government and society to tackle the problems faced by the country. However, the years after independence saw a lot of the government involvement in the running of the universities. Those governments did not pursue the research agenda of the universities, but their nationalistic views of how universities should be run instead. The years that followed saw the research mission of these universities becoming a *“lost mission”*.

#### **1.4 Earlier Mission of African Universities (Post Independence)**

The end of colonial rule and the attainment of independence in Sub-Saharan Africa ushered in a new phase in the history of HE in Africa. In the wake of independence, country after country founded what Lulat, 2005 calls “national universities”. These national universities were either completely new institutions or transformed from the Asquith Colleges.

These national universities were developed from a mixture of both nationalistic ambitions, similar to other symbols of sovereignty (such as the flag, national anthem and the international airport) and genuinely perceived discontent with the existing university colleges that the colonial powers had bequeathed the new governments.

Their establishment was based on the belief that HE was critical for national development and that public funds should be used for its support. In addition, with the attainment of political independence, or soon thereafter, many African countries regarded the establishment of local universities as a major part of the postcolonial national development project. The new universities were expected to help the new nations build up their capacity to develop and manage their resources, alleviate the poverty of the majority of their people, and close the gap between them and the developed world.

According to Lulat (2005) during the establishment of the Asquith Colleges in the colonies, there was very strong support from most circles of African leadership (many of whom had obtained their degrees at universities abroad, principally in Britain) for an externally awarded degree facilitated by the university colleges. To them, an indigenous degree from the newly created colleges would have been considered inferior degrees. In fact, a member of the Asquith Commission (Fred Clarke of the University of London) had observed, albeit in a different context that:

They [The Africans] may well look askance at any modified form of the London degrees, adapted to local conditions, even if the point of equivalence were beyond all doubt. They would probably reject altogether any form of degree which left room for doubt and would prefer to take the external degree as it stands, even if that should mean a considerable amount of private study. (Nwauwa, 1997: pp149).

That is any suggestion of adaptation was interpreted as acceding to the European stereotype of the African as intellectually inferior - and therefore incapable of handling undiluted Western education. In the words of Nwauwa (1997: pp150):

After almost a century of indoctrination that Africans were inferior either intellectually, creatively or in abstract thinking, it was essential that the curricula of proposed colonial universities should approximate that offered in the United Kingdom.

In the 1960s when universities were first established in Africa, their role and mission was to emulate the universities of the former colonial powers. The universities established then were to specifically educate a small elite group of civil servants according to the set of standards and curricula utilized in universities in the colonized countries (Saint, 1992; World Bank, 1991).

The earlier missions of African universities were also influenced by the political leaders who helped fight for independence. These “Independence Liberators” during the establishment of the colleges (and later the national universities) in their respective countries defined what the mission of the universities should be. It should be understood that these Independence Liberators were nationalistic and their ideological inclination influenced how universities were run years after their establishment.

Mosha (1986) states that at the onset of independence in Africa, several heads of state demonstrated confidence in university education as a driving force in nationalism. For example, Tanzania’s Julius Nyerere (1967: p82) referred to academics as the “torch bearers of our society and the protectors of the flame”, and Ghana’s Kwame Nkrumah considered the university “the Academic focus of national life reflecting the social, economic, cultural and political aspirations of the people” (Carte, 1964: p83).

In his opening address in 1960 to the interim council of the University of Ghana, Dr Kwame Nkrumah, President of the republic, declared:

... A very heavy responsibility is being entrusted to you. The whole future of Ghana depends to a very considerable extent on the success of our programme for HE and research. It is necessary therefore that we go about the task of organizing the new university in the most resolute manner and that we do not allow ourselves to be distracted from our duty by ill-informed criticism, either in Ghana or abroad, and that we set our eyes resolutely upon the main task which is to produce a university which will serve the needs of African unity, will make practical and concrete contributions to the development of Ghana and the well-being of this country, and, indeed, of all Africa, and yet which will have a world-wide academic reputation (Dillon 63: pp).

Kwame Nkrumah continued in defining the role and mission of African universities as:

... African universities like their counterparts elsewhere have the responsibility to advance the frontiers of knowledge through teaching and research.... However, no single type of foreign university can, in itself, meet the aspirations of the African people for social and economic development. Each country has its own genius and its special characteristics....

To President Kwame Nkrumah, the mission of the new universities in Africa first and foremost was to use their teaching and research to better the life of the people of Africa. In addition, these universities should have an academic reputation like any university in Europe or the USA. However, his definition was influenced by his nationalistic beliefs. Although he mentions research as one of the core activities that universities in Ghana and Africa, it is clear there was no commitment from his government to the universities to undertake critical research.



Nyerere (1970: p198) defined a university as

...an institution of higher learning, a place where people's minds are trained for clear thinking, for independent thinking, for analysis, and for problem solving at the highest level.

Nyerere found it prudent to elaborate on the definition by maintaining that a university has three major functions/missions, which are to:

1. Transmit advanced knowledge from one generation to the next so that it can serve either as a basis of action, or as a springboard for further research;
2. Provide a centre which attempts to advance the frontiers of knowledge by concentrating in one place some of the most intellectually able people who are not preoccupied by day-to-day administrative or professional responsibilities, and making available to them good library and laboratory facilities which are necessary to support learning; and
3. Provide through its teaching for the high-level manpower needs of society.

(Moshia, 1986: p114)

From his first point, it is clear that Nyerere believed that universities remained the source of new forms of knowledge. The knowledge generated or gained from a university could help in national development and so serve as a basis for future research. According to Nyerere (*ibid*), universities are centres where knowledge could be passed on from one generation to another. Additionally, he believed that universities should provide the manpower required by industry. Nyerere concludes that the three functions mentioned above are interlinked; and he cautions that any university which attempts to prohibit any of them would most likely die.

In addition, the mission of an African or national university should be that it serves a centre where new knowledge can be advanced by researchers and academics whose core responsibility is to carry out cross-cutting research and teaching. However, this was not the case since most people appointed to posts in the national universities were interested in advancing the ideologies of the nationalists (who were mostly campaigners for independence). In addition, most universities in Africa both then (and still now) did not have proper libraries and laboratories in which to carry out the research. Finally, the mission of providing high-level manpower needs for national development is still being pursued, and is still the core mission of most African universities.

One of the reasons for creating universities in Africa was to undertake research to help better the lives of its people, and to make universities relevant to their communities and other universities abroad. However, the issue of research as a mission of African universities was



not included in the broader debate of the mission of African universities. This is evident from the dearth of publications and innovations from universities in Africa since their establishment. At the end of the 1970s, most of the independent liberators (who also served as chancellors of their national universities) were overthrown by military governments. With the onset of the world economic crisis in the 1980s, African universities reassessed their role and mission with regard to their countries' economic development efforts. This was supported by UNESCO, and the Association of African Universities required universities to develop relevant curricula taking into account African culture, with more accountability and service to their communities, to search for new funding sources, and to emphasise research (Dia, 1993; Mohamedbhai, 1994; Brock-Utne, 2002).

In addition to their traditional role of giving a broad liberal education, African universities were to reflect the needs of the African world by providing African societies with skills that would enable men and women to participate fully and usefully in the economic and social development of their continent.

## **1.5 Conferences to discuss the Mission of African Universities**

Since the establishment of universities in Africa, a number of conferences have been held to establish the notion and mission of Africa universities. These meetings brought together key stakeholders in HE across Africa and assessed the role and relevance of universities at each period of its history.

### **1.5.1 The Addis Ababa Conference (1961)**

According to Mwira (1992) and Sawyer (1994), the first major meeting on education (including HE) in Africa was the Conference of Ministers of Education of Independent States in Africa at Addis Ababa in 1961. The meeting discussed education at all levels including university education. The meeting declared education as the means by which development will take place at all levels – individual, local, national and regional. At the end of the conference, a call was made for African governments to put more resources into educational development which was seen as the fulcrum for creating a new Africa.

The Addis Ababa Conference was a landmark in the development of education on the African continent. It was the first international conference to be held in Africa to discuss education not only for, but also by, Africans. It also launched a new development philosophy that recognised the pivotal role that the educational systems, especially HE, played in the social, economic

and cultural transformation of nations. Therefore, it was decided that African culture should be an integral part of HE (Banya & Elu, 2001).

### **1.5.2 Tananarive Conference (1962)**

The second major conference was the UNESCO/Economic Commission for Africa Conference for University Leaders and Other Participants from the donor community and representatives from various African governments held in Tananarive, Madagascar, in 1962 (Wilton, 1963). The conference was a follow-up to the Conference of Ministers of Education of Independent States in Africa held in Addis Ababa (1961). It was also attended by ministers of education and heads of universities. The consensus at the conference was that universities were a "key instrument for national development", a concept that later gave rise to the notion of the "developmental university" that is, a university whose work and mission are directed towards the attainment of concrete and demonstrable development goals. The 1962 conference at Tananarive (now Antananarivo), Madagascar, assigned African universities seven roles which include:

- i. teaching and advancing knowledge through research;
- ii. adhering to and being loyal to world academic standards;
- iii. ensuring the unification of Africa;
- iv. encouraging the elucidation of and appreciation for African culture and heritage, and to dispel misconceptions about Africa, through research and the teaching of African Studies;
- v. training the 'whole person' for nation-building;
- vi. developing human resources for meeting labour force needs; and
- vii. becoming truly African institutions of higher learning over the years, dedicated to Africa and its people, promoting a bond of kinship to the larger human society and to emphasise science and technology, so that the continent would be able to produce by 1980 sixty per cent of its own doctors and agriculturalists.

Firstly, delegates at the conference wanted universities in Africa to carry out research (both basic and applied). The outcome of their research should be used in their teaching to keep students abreast of new knowledge in their fields of studies. Indeed, research generates new knowledge and adds to the already existing scholarship. In that regard, African universities as frontiers of knowledge were expected to advance knowledge through their research and uplift their societies, and also for further research.

Secondly, African universities were advised not to set their own standards but to maintain and adhere to world academic standards, and especially levels or standards of universities in Europe and the United States. This point was a caution to nationalist and independent governments who thought African universities should nationalize and Africanize their curricula. African universities were expected to train graduates and undertake research like universities in other parts of the world with which they were formerly affiliated – and thereby maintain international academic standards. African universities forged links with British universities, and thus benefited from their vast experiences in various fields including examinations and research.

On the third and fourth points, African universities were supposed to also focus on African studies and research that would be relevant to the problems which African societies faced. This would also preserve the heritage of the African people. African universities were expected to collaborate among themselves in all fields, and thereby promote unity on the African continent.

African universities were mandated by their national governments and their own missions to train the manpower needed for African countries. In the years that followed, African citizens trained other Africans for the independent states of Africa through university education. The concept of a development university, which emerged from the conference, was to replace an earlier concept where science and technology studies were marginalized in African universities. However, the major focus of delegates on science and technology development was the training of at least sixty per cent of doctors and agriculturist who were needed in Africa. Although Africa has been able to train many doctors over the years, the numbers trained have not been able to keep up with the demands of any single African country yet.

### **1.5.3 The Accra Workshop (1972)**

According to Kargbo (2002), it was during the 1972 Accra Workshop on the state of university education in Africa, organized by the Association of African Universities (AAU), that the concept of the “African University” was coined. The workshop concluded by summarising the major functions of the African university as follows:

1. To pursue, promote and disseminate knowledge;
2. To conduct research;
3. To provide intellectual leadership; and
4. To promote social and economic transformation.

The workshop was organized at a time when Africa was facing lots of challenges: economic crises, drought and food insecurity, and political unrest were prevalent in most of the independent states. Delegates to the meeting, including ministers of education and heads of universities saw the need to revisit the missions and functions of the African universities. The change in mission was influenced by public interrogation on the relevance of universities in tackling the problems that faced the continent at that time, and also from international organizations, including the International Monetary Fund (IMF) and the World Bank.

The missions outlined and agreed on at the 1972 Workshop were different from that of the 1962 Meeting in Tananarive, Madagascar. The 1972 Workshop had just a four-point agenda which outlined the new missions of the African university. The new missions were needed to make African universities relevant to their governments and societies. The focus of the 1972 Workshop was thus not on the Africanization of universities in Africa and their activities, as was the case at the 1962 conference.

The first point the Workshop made was that African universities were expected to carry out relevant research (which meets the current challenges of African countries). The outcome of their research should not be kept on the shelves but should be disseminated to relevant stakeholders to help in decision making. In the decade after their establishment, African universities were perceived as elite institutions which did not focus on meeting the needs of ordinary people and society.

The delegates agreed that research was crucial for exploring new forms of knowledge that were needed to tackle the problems facing many of the African universities. Although the conference did not stipulate whether the research should be applied or basic, it was clear that the problems facing most African societies at that time needed basic research to produce some solutions, and besides, in the 1970s, universities did not have the funds needed for carrying out applied research. Applied research would also take more time to conduct and African universities needed to produce results quickly because their relevance was seriously being challenged.

The third function of African universities mentioned at the Accra Workshop related to leadership. Leadership had remained a problem for African universities because in the periods after independence the state had become involved in the management of the universities. The autonomy of universities was seriously compromised by the nationalist governments, and later the coup leaders, and this affected activities at universities. Universities felt they would be

considered to be more relevant to their respective countries if they demonstrated independent leadership.

With regards to the fourth mission, African universities realised they needed to take a leading role in the promotion of the social and economic transformation of their countries, in the midst of the numerous challenges on the continent. It was envisaged that African universities would publish their research findings and articles in national newspapers and local journals, and that university experts would offer critical opinions on systems of governance and selected economic decisions made by their governments.

#### **1.5.4 The 1980 Tananarive Conference**

Another conference was held in 1980. The African delegates (mostly university administrators and government representatives) to the Tananarive Conference, in introducing their preliminary report, authorised these statements:

The establishment and development of university institutions in Africa raise fundamental issues of their precise role in African life. Should they merely perform the traditional functions which the universities of Europe have performed for centuries in their own societies? Should they take on additional roles which, radically distinguishing them from the other European institutions, fit them nevertheless for greater service to the African society? (Dillon 1963: p77)

With their promise of indigenous knowledge, local production of expertise and cadres to staff the public services, the professions, and industry and generally conferring prestige and giving meaning to national sovereignty, universities were, according to Coleman (1994), "unambiguously national institutions set up for national purposes".

In conclusion, although manpower development was, and remains, the major role foreseen for the HE sector in Africa, other goals have been added over time. In addition to human capital development, universities are expected to generate and disseminate knowledge and innovation, act as the intellectual and educational leaders for the whole education system, provide a vehicle for service to the local community in analysing and solving problems, and support conservation. These are all different perspectives on the mission of a (African) university.

African universities have been labelled differently in different eras. Just after independence, the universities colleges created by the colonial governments were transformed into national universities (Lulat, 2005; Bening 2005). National universities were symbols of national pride

and self-rule. The universities were expected to offer courses that would advance the “nationalist” agendas. National universities were seriously politicized when liberation governments made appointments in these institutions, and this affected the output of these universities, especially in the area of applied research.

### **1.6 The Era of Developmental Universities**

To Cloete, Maasen and Bailey (2015), soon after independence, a ‘development’ discourse emerged, and 1960 was heralded as the ‘Year of Africa’ and the beginning of the so-called ‘development decade’. In September 1962, UNESCO hosted a conference on the ‘Development of HE in Africa’. A decade later, in July 1972, the AAU held a workshop in Accra which focussed on the role of the university in development (Yesufu, 1973). The importance of the university in newly-independent African countries was underscored by the now-famous ‘Accra Declaration’ that all universities must be ‘development universities’ (ibid.). Controversially, Workshop participants agreed that this was such an important task that universities could not be left to academics alone; governments should also be responsible for steering their development.

While many nationalist African academics enthusiastically supported the role of the ‘development university’, seeing it as support against the expatriate professoriate that dominated institutions, it sat uncomfortably with expatriates and some ‘globally orientated’ African academics. This latter group was more comfortable with the traditional model of the university as a self-governing institution (i.e. governed primarily by scholars) that predominated in the UK and the US at the time. This self-governing model had been the dominant model in the first two decades following independence, and there was considerable agreement between universities and ‘liberation’ governments that the role of elite universities was to produce human resources for the new state.

Political leaders began to voice their growing impatience with the colonial model of liberal arts and basic sciences as the path to professional employment in the services and business, especially those concerned with building up high-level, more specialized skills for the public service and leadership of the professions. This dissatisfaction came to a head at the UNESCO/Economic Commission for Africa Conference organized for university leaders and outside participants in Tananarive, Madagascar, in 1962. The consensus at the conference was that universities were a “key instrument for national development”, a concept that later gave rise to the notion of the “developmental university”, that is, a university whose work and mission are directed towards the attainment of concrete and demonstrable development

goals. However, the developmental mission envisaged by the Tananarive consensus did not quite materialize.

After years of the marginalisation of science and technology research at African universities, there was a general call in the mid-1970s to universities to make science and technology research outcomes relevant to the needs of the society and community.

The concept of a developmental university was first articulated at the AAU-sponsored Workshop in Accra on the emerging issues confronting African universities in the 1970s, in response to the criticism that the development of African universities in the preceding decade had rendered universities

... hardly more than white elephants and flashy symbols of modernization: ivory towers occupied by a minority elite, expensively educated and expensively continuously maintained, at the expense of the vast majority of the population with whom they have little in common (Yesefu, 1973: 78).

The concept demanded universities to be relevant in terms of curricula and function to the specifics of African circumstances.

Relevance in essence meant being immediately and directly responsive to the development needs of the African countries, and this therefore required a reorientation of the function of the university to, among other things, an emphasis on development-orientated research. This meant the using science and technology to solve problems of development. (Lulat, 2003 & 2005).

According to Lulat:

... a university must be dedicated to research - fundamental and applied. But again priority must be given to research into local problems that will contribute to the amelioration, in particular, of the life of the ordinary man and the rural poor. Emphasis must accordingly, be placed on such topics as: rural health; the problems of poverty in its varying contexts; the conflict of cultures in multi-ethnic societies and basis for unity and agricultural and rural development. (Lulat: 2005: p363)

The development university concept was here to stay and in the years that followed universities in Africa established faculties for developmental studies. In Ghana for instance, the University for Developmental Studies was established in Tamale, Northern Region. The mission of these development universities was to help tackle the developmental changes facing African communities and some basic (not applied) research was done, focusing on rural development and on selected cases of national development.

While universities in Africa have been involved in teaching since their establishment, this has mostly been for training the required human resources, and only recently by research. This is due to several factors. In the period 1970 to 2000, most universities in Africa did not have the funds to carry out research activities or community service, they stuck to their core mission of teaching and producing graduates for national development.

Despite the rhetoric of the 'development university' in the early years of the establishment of African universities, African governments did little to promote the development role of these institutions. In part the above was because many of these governments had not developed a clear and integrated development model, with notions of what the role of the universities would be. Instead, many African governments and their universities became sites of conflicts around the development model of the state increasingly entangled in internal power struggles, as well as the external politics of the Cold War and the politics of funding agencies, such as the World Bank. Instead, 'not leaving the universities alone' became interference by government, rather than steering (Moja *et al.* 1996).

Although the concept of the developmental university continued to be discussed among key stakeholders in Africa the early 2000s, universities in Africa at this time were trying to label themselves as "research universities". The emergence of the university rankings was a wake-up call to African universities who were poorly ranked. African universities then realised the need to seek funds from donors to strengthen their research by developing links with advanced universities in South Africa, Asia (China), Europe and the United States of America.

Since 2000, the notion in the missions and roles of African universities have shifted to meet the global changes (shifts) in the missions of universities. The advent of the university ranking, internationalization and the issue of massification among the World Class (WC) universities made university administrators and national government revise the mission of the university in the 21<sup>st</sup> century.

In the next section (1.6.1), I discuss factors which prompted a shift in the mission and roles of African universities.



## **1.7 The Changing “Missions” of African Universities**

### **1.7.1 Shift in missions and roles of African universities**

The period after independence saw African governments creating new universities with a new missions and roles. As discussed in the earlier section, most independence liberators saw the earlier mission given by colonial governments to university colleges as irrelevant to the development needs of Africa. These colleges also were not useful for advancing their “nationalism” agenda.

Years after these national universities were created, most of these governments were overthrown. The new governments interfered in the administration of universities by appointing their political affiliates to positions of authority, and in some cases instructing heads of universities on how the universities should be managed. As a result, these universities remained largely irrelevant to society and their missions were not realistic. External problems coupled with internal matters within universities (such as lack of funds) led to the closure of some universities. The world economic crisis and society’s call on universities for their missions and activities to be tailored to society’s needs, prompted African universities to review their missions and roles. This call began in the late 1970s (Sawadogo, 1994; Coker-Kolo & Darley, 2003; Ramphele, 2004; Huisman, 2008).

During the early 1980s, researchers and other global expert bodies such as UNESCO and the World Bank sought to propose possible solutions to revitalize African universities in ways that would make them more relevant to their respective environments (Dia, 1993; Mohamedbhai, 1994; Sehuule, 2008). Sawadogo (1994) asserts that within Africa itself there were also calls by experts and the AAU for the reassessment of the roles and missions of African universities to better prepare these institutions to meet Africa’s developmental needs for the 21<sup>st</sup> century. According to Sawadogo (1994: p1 & p20), one reason for the call to reform the mission of African universities was that, “... Universities should shift their emphasis from providing abstract knowledge to problem-solving skills”.

The above call arose because universities in the 1980s were seen to be producing knowledge for its own sake, knowledge that was only useful in academia. Most researchers and academics carried out research and published in journals but the fields of research and training were not orientated towards development and were therefore considered irrelevant. There were calls from industry and the service sectors for universities to train the needed manpower for their fields. Abstract knowledge was useful for academic purposes, but universities needed to produce graduates with problem-solving skills.

At the beginning of the 21<sup>st</sup> century, it became clear that the mission and notion for establishing universities in Africa had shifted or should shift from the earlier mandates (Sawyerr, 2004; Coker-Kolo & Darley, 2003).

According to Kamola (2011), at the beginning of the 21<sup>st</sup> century most universities around the world were consciously remaking themselves into 'global' institutions. Downplaying their particular histories, they emphasised their 'global' qualities, and positioned themselves for global leadership in research, teaching and active engagement in global issues. These changes took many forms, including a greater focus on departments and programmes on global studies, increasing opportunities for students to study abroad, developing classes on global diversity, and changing their branding campaigns to reflect their interest in globalisation.

There was a shift in the missions of most Western universities (Altbach, 2001). New concepts that necessitated this shift included universities and globalisation (Brock-Utne, 1996); entrepreneurial universities (combining teaching and research and, contributing to the economy, particularly in their local regions (Etzkowitz, 1997; Clark, 1998; Etzkowitz et al., 2000); universities and the knowledge economy (Banner & Sandstrom, 2000; Person, 2000); research universities (Muchie, 2008; Altbach, 2007, 2010); and the notion of 'world-class universities' (Altbach, 2001; Sharma, 2005; Huisman, 2008).

The shift in the missions of African universities, like universities on other continents, were also influenced by global trends but for other reasons too, which are explored in the next section.

#### **1.7.1.1 Globalisation and Knowledge-based Competition**

A knowledge economy relies on knowledge as the key engine of economic growth. It is an economy in which knowledge is acquired, created, disseminated and applied to enhance economic development. A knowledge-based development process requires the following conditions: education; information and communication technologies (ICTs); an effective innovation system; and governance and policy support.

Knowledge-based competition within a globalising economy prompted renewed reflection on the role of HE in development and growth. According to Altbach and Salmi (2011), at the beginning of the 21<sup>st</sup> century, after years of neglecting HE in Africa, African leaders recognised that the continent's development depends on its ability to fit into today's knowledge economy. This realisation by both African leaders and universities in Africa was influenced by the concept of globalisation.

Globalisation is often associated with competition and market-steering, transnational education, and finally with commercial knowledge transfer (cf. El-Khawas, 1994; Lenn, 1999; and Middlehurst, 2000). Some argued that globalisation, broadly defined as largely inevitable global economic and technological factors affecting every nation, would liberate HE and foster needed change; technological innovations such as the Internet, market forces and other factors would allow everyone to compete equally.

Furthermore, Africa's ability to find a place in this era of globalisation would depend largely on Africa's ability to be a viable contributor to the global pool of knowledge. Universities through research are at the core of knowledge generation; the universities transmit knowledge produced primarily through teaching and applies these knowledge engagements with the wider society.

Universities in Africa began to redefine themselves within the new global arena and wanted to compete. This made African universities shift from their earlier core mission of teaching and producing graduates to a new core mission of producing new and applied knowledge through research.

However, HE institutions in Africa face numerous challenges, which currently hinder their contribution to the knowledge domain. These include limited funding, leadership and governance, the brain drain, poor working and living environments, HIV/Aids and globalisation (Oyewole, 2010).

To meet the demands of growing globalisation and of contributing to the global knowledge economy, universities in Africa have begun to develop new strategies including tapping into the global sources of knowledge; producing graduates of a high-calibre; refining their research quality; improving university leadership; and ensuring efficient management and setting up quality assurance. In addition, selected African universities have improved on their Information Communication Technology (ICT) infrastructure (although there is more to be done). The improvement in ICT is due to the realisation that ICT will increase global visibility and productivity and the overall enhancement of teaching and research collaboration.

Globalisation presents a lot of challenges to African universities. Universities need to strengthen and consolidate their potential in teaching, research, scholarship and innovation, to ensure that they deliver graduates equipped to tap into global knowledge resources and apply what they have learned in support of local and regional development.

### **1.7.1.2 Call from International Organizations and Affiliations**

After many economic reforms on the African continent, including the structural Adjustment Programme in the early 1980s, and the deteriorating nature of African universities due to insufficient funds, international organizations, including the World Bank and IMF, all called for the shift in missions of most African universities (Dia, 1993; Mohamedbhai, 1994; Assie-Lumumba, 1996; Brock-Utne, 2002). At the time these calls were made, there were temporary closures of many universities due to agitation by lecturers and students against government policies on university education. Ghanaian and Nigerian universities were shut down for more than a year in the 1990s. The general public did not sympathize with the closure of the universities because they at the time have not seen the relevance of university education and research for national development.

There were also calls to review aspects of the curriculum which were deemed unimportant to national development. Governments were no longer in a position to fully fund national universities and had to bring in foreign partners. The World Bank (2002) emphasised the need for reform, including a shift in mission of African universities to make them relevant. The World Bank stressed that the key question was the role of universities in economic development, poverty reduction and the sustainable use of natural resources.

The World Bank acknowledged and incorporated this understanding into its Africa Action Plan for 2006-2008, which outlines several roles for HE in its strategic objective of building skills for growth and competitiveness. These include providing relevant skills for the labour market; understanding and using global knowledge in science and technology, particularly for agriculture; accessing existing information and generating new understanding through research; and working much more closely with the productive sectors of the economy.

The calls from long-standing international donors and organizations compelled African universities to change their core mission of teaching into a more integrated mission (with research at its core). Universities were asked to make research part of their new missions in order to give insight into problem areas on the continent that need urgent solutions, especially at a local level.

### **1.7.1.3 World University Ranking and World-Class Universities Status**

The ranking of world universities by the Shanghai Jiao Tong Academic Ranking of World Universities (ARWU), Times HE World University Rankings (THES) and QS World University Rankings (THE QS), made African universities realise that if universities they wanted to find a place among universities of the world, they needed to shift their missions.

Although the rankings are far from perfect, Shin *et al.*, (2011) assert that policymakers and the media evaluate universities according to their rankings, and that university leaders use these rankings as a benchmark in their strategic plans.

African universities performed badly in the initial rankings, and this led to the view that African universities were not living up to expectations on the international front. After the release of the first university rankings in 2004, African universities started to adopt the indicators which were used in the ranking and tried to reform their universities along those lines. Consequently, they invested more effort into doing research and publishing in international journals. Postgraduate studies were also encouraged, especially at the masters' level, since they didn't have enough professors and laboratories to undertake the supervision of doctoral students.

Altbach and Bala (2007) mention that the central theme of HE policy in the mid-2000s was the issue of "world-class universities", and this became high on the agenda across the globe. African universities with their several challenges pursued their primary function of teaching right up until the early 2000s when there was global shift in the role and missions of universities (Ramphela, 2004; Bloom *et al.*, 2006).

Supporting or developing a world-class university is now considered by many to be a necessary and unavoidable step towards becoming globally competitive.

Of the various concepts which necessitated the shift in missions of African universities, it's the concept of being a 'world-class university' which most African universities embraced, and they began to develop strategic plans for the next decade with the goal of becoming "world-class universities" (WCUs). For instance, in redefining its new mission, the University of Ghana (UG) stated that, "It would aspire to move closer to some of the world renowned universities who have achieved world-class status through cutting edge research" (UG, 2012).

The UG goes further to give its definition of a world-class university as:

... One with faculty members doing first-rate research, in the basic sciences to the applied as in the hybridisation and manipulations of genomes of organisms as well as the ability to secure international and collaborative funding. The faculty members should be widely cited and associated to important discoveries, thus attracting other talented researchers and students around the world (UG, 2012).

In addition:

... World Class University has technology transfer high on the agenda which in turn spins out companies and consequently is in a position to train manpower to man these

companies. World-class universities generate ideas, for example, development of new crop varieties or production of sustainable energy sources that the citizenry depend on. One of the most important attributes of a university engaging in cutting edge research which advances knowledge is its ability to train responsible and reasonable students capable of making informed decisions based on independent scientific bases and who are in high demand in academia as well as in industry both locally and abroad (UG, 2012).

African universities have embraced so much of the concept WCU and many have a vision of becoming WCUs by 2020 -2030. Although this vision is a good one and should be encouraged, becoming a WCU comes with great cost and commitment from national governments and the universities as a whole. African universities have several problems they will need to overcome if they aspire to becoming WCUs, such lack of funding; issues of accountability; autonomy; and relevance. However, each country in Africa should strive to have at least one WCU.

#### **1.7.1.4 Issues of Research**

One key issue which necessitated the change in the mission and roles of African universities was the type of research African universities should undertake. In the earlier mission of the African universities, although research was mentioned as a key mandate, the type of research which these universities needed to undertake was not emphasised.

As far back as 1972, Yusefu suggested that African universities must not pursue knowledge for its own sake, “[b]ut for the sake of, and the amelioration of conditions of life and work of [the] ordinary man and woman” (Yusefu, 1973: 45).

Researchers in universities in Africa, as explained earlier, were interested in research which influenced their promotion with the university and that reflected on their research outputs. Outcomes of research carried out at the universities were hardly disseminated to the public, and in some cases were kept very confidential. Mention has to be made that universities were also under attack from dictatorial governments within their respective countries who did not like researchers publishing anything contrary to official state findings. This also forced universities in Africa to focus on knowledge for its own sake.

However, Makgoba (1998) and others (Adams, 2005; Nabudere, 2006) maintain that the pursuit of knowledge for its own sake has been one of the cornerstones of university education, and argue that for universities to keep their traditions and survive they have to train new people in the various fields. Unfortunately, though, the people trained are mostly made to

undertake research that is relevant to the field of their training, but not to that of their community or country.

While this type of knowledge is very important for the sustainability of a university, the products of such training should also be able to fit into the overall development agenda of the country. Universities in Africa have realised this and have more recently tried to make postgraduate training relevant to their nation, moving away from basic research only to include more applied research.

The writers of a NUFFIC<sup>1</sup> report published in 1978 maintained that the basic question that African universities ought to address was “whether basic or applied research carries greater priority for national development?”

In some cases, the outcome of basic research can be piloted at the local or community level. Applied research, however, generally takes more time before an outcome can be applied to a community; requires a lot of funding, as well as experts in the field of study to guide it.

Issues of insufficient funding for research remain paramount at most African universities. In most cases, postgraduate students have to fund their research themselves. In addition, African universities often do not have well-equipped laboratories and libraries to facilitate research. It is obvious that universities in Africa still conduct mostly basic research, and research mainly in the fields of basic social sciences and those related to agriculture.

Sey (1989) adds that universities in Africa have traditionally been more identified with basic research, despite their context of pressing problems, which requires research to be more applied than basic. In addition, Benneh (2002), in suggesting the way forward for effective research management at African universities, mentioned that universities should heed the increasing demand for applied and relevant research, but also make efforts to sustain basic research.

To improve their research mission, most universities in Africa have also established offices of research and development and school or faculties of research and graduates studies. An office of research and development is very new to most African universities, and are mainly be found at flagship universities, such as the UG and the University of Ibadan. The belief is that these

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<sup>1</sup> NUFFIC is the Netherlands organisation for international cooperation in higher education. As an independent, non-profit organisation based in The Hague



schools, faculties or offices for research will increase the focus of the university on research, improve the quality of research and attracting funding for it. The task of these offices is also to help foster and improve relations with other research and donor institutions.

The new research missions of African universities have forced universities to develop research policies to guide them in improving their research. In addition, universities have also developed research ethics and general research guidelines for their academic and research staff. Postgraduate studies have also been included in the new research missions of African universities and consequently Masters and PhD enrolments have increased at most African universities.

Overall, the new research mission of African universities focuses on making universities undertake both basic and applied research. Universities in Africa have realised that they need to contribute to the new knowledge economy, which can only be done if they undertake cutting-edge research that produces new innovations and knowledge products. Research is also the avenue that will enable universities in Africa to publish in high-impact journals and improve other indicators used to measure WCUs.

#### **1.7.1.5 Internationalization**

Another mission which most African universities have adopted as a result of the global shift is the mission of internationalization (Altbach, 2009). The 21st century is rapidly heading towards globalisation.

Although *internationalization* has become a new mission for African universities, the concept is not a new one. According to Dillon, (1963), Sawyer (1994) and Jowi (2008), during the UNESCO Conference on the Development of HE held in September 1962 in Tananarive for the heads of governments and universities in Africa, one of the key questions discussed was “the national and international mission of an African university”.

According to the delegates at the conference, although universities in Africa had mandates to train their students in an African context, the universities as a whole needed to have an internationalization mission. University administrators and governments at that time asserted that, having international missions will increase their chances of collaborating with other universities in Europe and in Africa. In addition, the international mission of African universities would help its students to have a world-class training which will enhance their ability to compete with graduates from across the world.



The mission on internationalization has not up until recently been fully pursued chiefly because most post independent governments and other nationalists in pushed for the “Africanization” of university curricula and other key activities. However, since realising the importance of internationalization, it has been a core mission of African universities since 2000 (Jowi, 2009). While there is no commonly shared definition for the internationalization of HE, one of the most widely used versions sees it as “the process of integrating an international, intercultural, and global dimension into the purpose, functions (teaching, research and service) and the delivery of HE” (Knight, 2004: 9).

Internationalization is often discussed in relation to physical mobility, academic cooperation and academic knowledge transfer, as well as international education. While the growing importance of internationalization and its impact on HE systems is not doubted, it is becoming more evident that the rationale that drives the process vary from region to region, from country to country and even between institutions (Knight, 2008).

Although traditionally the rationale for internationalization has mainly been framed in social/cultural, political, academic and economic terms (Aigner *et al.*, 1992; Scott, 1992; Warner, 1992; Knight and De Wit, 1999), recent studies reveal some shifts (IAU, 2005; Teferra and Knight, 2008). Increasingly, a variety of rationales and activities can be observed both at the institutional and national levels (Van der Wende, 2001; Huisman and Van der Wende, 2004). The importance of these rationales also differs per country and over time (Luijten-Lub, 2007). While the economic rationale has been the most dominant in Europe in recent years (Luijten-Lub, 2007), the 2005 IAU Global Survey on Internationalization (IAU, 2005) and Teferra and Knight (2008) reveal that in African universities the academic rationale is dominant.

The two studies show that African universities prioritized the need to enhance research capacity (33%) and their institutional academic capacity. African universities viewed improved academic quality, innovations in curriculum, teaching and research, and greater international cooperation as significant. In a general sense, the main rationale for African institutions is therefore the need for institutional and academic strengthening, which is reflected in the limited research capacity in most developing nations and the gaps in the research infrastructure at the human, physical and technical levels.

Internationalization of HE includes both ‘campus-based’ and ‘cross-border’ activities that are often referred to as ‘internationalization at home’ and ‘internationalization abroad’ (Knight,

2008), both of which have different but related manifestations. As internationalization begins to gain pace in Africa, certain areas seem to be playing a significant role.

A number of challenges face the African HE sector as it grapples with the requirements of internationalization. Teferra (2008) points out that attempts towards Africa internationalization have been engulfed in weaknesses that emanate from the confluence of historical, economic, educational, financial and paradigmatic contexts. These, he argues, make it more complex to track the challenges, address the risks and maximize the opportunities of internationalization. The challenges include institutional drawbacks, the quality of academic programmes, regional frameworks and policies, and funding and resources.

For most African universities, internationalization also poses serious risks. The impact of some of these have already had serious consequences for the HE sector of the continent.

The highest-rated risk is the now perennial issue of brain drain, while commercialization is the second serious risk that African institutions identified. The commodification and commercialization is mainly as a result of the influence of internationalization in the marketing of the sector, and includes the struggle for increased funding, the commercialization of research and services that could counter the goals of relevance and equity and thereby easily erode the public good.

The other identified risks in order of priority are the increase of foreign 'degree mills', loss of cultural identity, homogenization of curricula and quality issues.

Internationalization also presents advantages in the form of new possibilities for revenue generation, enhancing institutional competitiveness and developing strategic alliances that could enable African universities to feature and contribute to global knowledge society, while still responding effectively to Africa's many developmental challenges.

Although the recruitment of students and staff from abroad is an important aspect of internationalization at home, this has not been very successful in African universities for reasons ranging from a perceived low-quality of academic programmes, poor marketing, rising local demand, the lack of credit transfer modalities and weak institutional support structures among others.

With more outbound than inbound mobility - except for Egypt and South Africa - no sub-Saharan African country is listed among the top-fifty host countries for international students.

Universities in South Africa, however, have become a hub for postgraduate studies for students from English-speaking African countries. More than 10% of the student population of the UG and about 5.3% (in 2007 about 1800 of 34,000 students) of the University of Makerere come from countries within their respective sub-region.

Universities in Africa have been trying to embrace internationalization since the early 2000s, and to this end, most universities in Africa have created or established international offices either as a separate department or faculty of their universities. These offices coordinate the activities of all international students and faculty on campus and, in some cases, the university relations with other international institutions. However, this has mainly happened at the flagship universities of the respective countries. Although internationalization comes at great cost; universities in Africa should focus on the opportunities it brings and try to deal with the challenges it presents, as it is through internalization that they will realise their mission of becoming WCUs.

## **1.8 Shift in the Missions of Ghanaian Universities**

### **1.8.1 Introduction**

This section discusses the earlier mission of African universities and the shifts in their missions and roles over the years. This is followed with a discussion on Ghanaian universities and their current missions in order to identify whether the shifts follow the trajectory of other universities in Africa.

### **1.8.2 Post Independence (post National university era)**

At the end of colonial rule in Ghana, the University College of the Gold Coast (Ghana) was made a national university to symbolize national pride and sovereignty (beginning in 1959 and reaching its climax in 1961). The first president, Kwame Nkrumah, demanded direct participation in the governance of the university (Dillon, 1963 and Carte, 1962).

According to Lulat (2005), one problem with the nationalization of Ghanaian universities was the problem of autonomy. The unstated bone of contention was patronage: President Nkrumah and his Convention People's Party (CPP) wanted to commandeer the college as one more avenue for conferring patronage on favoured associates through appointments to key positions (including teaching positions).

The criticism (which by no means was entirely unjustified) by President Nkrumah and others in his government, however, was that the University College of Ghana was not adapting to the needs of the country in terms of indigenizing the curricula as well as the teaching and administrative staff.

The indigenization agenda of the government at the time set the original mission of the UG, which was to push a nationalism agenda and the ideology of the CPP. This affected the way the university functioned, and also the role Ghanaians expected the University to play during and after its establishment.

The over-politicization of the national university affected its freedom to organize its own internal affairs as an independent cooperate entity, and the right of the faculty and students to engage in teaching and learning without external interference (basic academic freedom).

The nationalizing of universities in the early 1960s had a detrimental effect on university education and Ghanaian universities during that period followed the same pattern as other universities across Africa. According to (Janus, 1980), in almost all instances where national universities (fully state-universities) were locked into battles with governments in Africa, the universities did not emerge unscathed.

In Ghana during Nkrumah's rule, as part of the government nationalization policy, two other HEIs were developed: the Kumasi College of Science and Technology was turned into a successful university - the Kwame Nkrumah University of Science and Technology; and a science-teacher training college was established in 1962 – the University College of Science and Education. In later years, two other universities were created: the University of Cape Coast (a reconstitution in 1971 of the University College of Cape Coast founded in 1962) and University for Development Studies (created in 1992 at Tamale).

In the years that followed, university education was hampered by the various coup leaders; who took full control of the universities and reduced their funding, forcing them to shift their missions. In the early 1970s, Ghanaian universities were focussed more on teaching than any other core activities such as community service and research. The core function the universities played in those years was teaching and raising graduates for the job market.

The problem of universities being a place only for teaching persisted for a long time (even into the early 1980s). Concurrently, the country underwent a terrible financial crisis, and so the World Bank and the International Monetary Fund (IMF) suggested that universities in Ghana shift their focus towards training the needed manpower for small-scale industries. This

ushered in an era during which universities were labelled as vocational universities. Universities started diploma and certificate courses in mining and mining engineering among others. This same problem was being experienced by most other African universities too (especially national universities). However, it also gave industries the needed man power and also resourced graduates to start their own industries and businesses after school.

Discussions on the history of African universities or HE in Africa have not labelled universities in Africa as teaching universities. A teaching university is the one whose core mission is the pursuit of truth and learning. In addition, it has a teaching mission at the undergraduate and graduate levels as its core activity (Scott, 2006). Teaching university's focus is to train the needed man power for the country and the world. It trains lawyers, philosophers, among others. In studying the history of the missions of African universities, it is clear that the universities have never been labelled as "teaching" universities (but in actual sense universities in Africa up and until the late 2000's were teaching universities).

Again, between the 1970s and 1980s the call came from academics and individuals for Ghanaian universities to become more developmental universities (universities whose mission was not only to teach, but also to carry our basic research to tackle the problems communities faced). Several authors in the early 1970s and 1980s (Manuh *et al.*, 2007) maintain that Africa's chronic problems (acute food shortages and famine, disease, political instability, flux of ideologies and unguided political experimentation, ethnic and religious tensions, fast-growing populations, drought, poor technological input and, sometimes, laziness) could be tackled through university research. They believed that research would bring solutions that could improve practices.

In the years that followed, universities in Ghana became hard pressed for funds and the staff were always on strike. However, on the global stage the new mission of most universities was to become more of entrepreneurial (i.e. the university combines teaching, research and contributing to the economy, particularly the local region (Etzkowitz, 1997; Clark 1998; Etzkowitz *et al.*, 2000).

Universities in Ghana started to offer consultancy services on a large scale and also started to compete for international research funds by submitting proposals to donors. They also had more dealings with the community, receiving funds from industry for research and other core activities of the university including community service. Universities exploited the new label of "entrepreneurial university" to seek additional funding for their activities to make them more independent, rather than relying on government.

Then the global university ranking of universities started in the late 1990s and all the universities in Ghana were poorly ranked. For instance, in the first ranking, KNUST for was ranked in the 4000s. There was a public call from stakeholders and the general public on Ghanaian universities to improve their places in the rankings, which resulted in Ghanaian universities then adopting the ranking indicators as the standards against which they could measure their improvements.

Research and postgraduate studies were two of the indicators which universities in Ghana thought they could easily improve upon. The years that followed saw two major national universities in Ghana - KNUST and UG - change their missions to reflect their new strategic plans.

The UG adopted the following mission statement in 2001:

Our mission is to develop world-class human resources and capabilities to meet national development needs and global challenges, through quality learning, research and knowledge dissemination (UG, 2001).

Similarly, the mission of KNUST changed:

To provide an environment for teaching, research and entrepreneurship training in science and technology for the industrial and socio-economic development of Ghana and Africa (KNUST, 2001).

Universities in Ghana since 2006 have focussed on becoming world-class universities, with research (both basic and applied) as part of their core mission. The UG in 2011 launched its research policy with the goal of becoming a WC university. (This issue will be discussed in detail in the next chapter).

This shift in missions has followed the top universities in Africa (especially South African universities) and other top-ranked universities. However, to fulfil their new missions, the Ghanaian universities will have to carrying out applied research, publish in high-impact journals and improve their research collaboration among other things.

## 1.9 Summary

This chapter has extensively explored the shift in missions of African and Ghanaian universities that has taken place over the past century.

The main objectives of this chapter were to establish, among other things:

1. If research was part of the original mission and motivation for establishing university colleges in British colonial Africa;
2. If there has been a shift in the missions of African universities over the years and what necessitated those shifts;
3. If Ghanaian universities shifted from their original missions;
4. And if the shift followed a similar trajectory to that of other African universities.

It has been established that the commissions, culminating in the Elliot Commission, set up by the colonial governments made various recommendations for the need for the British Government to set up some form of HE system in British Colonial West Africa. These reasons were, among other things:

1. To end agitations from nationalists who had been advocating for HE institutions in British West Africa since the 1880s;
2. The need on the part of the colonial government to train people to take over the reins of government should the colonies gain independence; and
3. British concern that Africans who went overseas for university education returned to Africa “contaminated” and on their return brought with them inappropriate ideas such as Pan-Africanism and Bolshevism.

The Channon Report first raised the issue of research as an integral part of the mission of any future African university, considering it of equal importance to the teaching mission of any future African university.

The Asquith Commission’s report was the first to be fully adopted and implemented by the colonial government, and resulted in the opening of university colleges in Ghana, Nigeria and Sierra Leone, with the mission of “... providing for and promoting university education, learning and research”.

These colleges were nationalized at the end of colonial rule, and the era of national universities in Africa (including Ghana) witnessed the politicization of the universities management, including the appointment of academic and non-academic staff. This affected the chief mandate of universities and allowed the government to redefine the vision of the universities. The research mission was lost and nationalist ideologies promoted.

Since the end of 1970s, African universities have moved through various characterisations, being labelled as teaching, vocational, and then developmental universities among others. Ghanaian universities have followed the same trajectory and shifted from their original mission. The most recent shift has been necessitated by calls from international donors; the world university rankings; calls from stakeholders; internationalization; massification and most recently a striving to achieve “world-class university” status.

The conferences which have been organized to discuss the mission, roles and visions of African universities each defined new missions based on the socio-economic demands made on the university at that time. The emphasis was on local issues right up until the early 2000s. Only then did the issue of globalisation and internationalization feature on the agenda.

The shift from a core mission of teaching in the 1960s to becoming a WCU or highly ranked university in the 21<sup>st</sup> century has meant making research central to universities activities. In order to achieve this vision, African universities also have to improve their ICT infrastructure, teaching, research quantity and quality, and their postgraduate studies.

### **1.10 Conclusions**

The new missions of African universities have followed the global trends. The African universities have changed their missions and visions to include research as a core mandate. This new mission also includes promoting doctoral education as a strategic goal.

Throughout the period of changing their missions of African universities over the past 60 years, it was clear that African universities have sought to produce knowledge that will meet the human resource needs of their countries. They saw teaching students as the main means of transferring knowledge to students and by extension their communities and countries. Their missions have not at any point had a clear focus of ensuring the knowledge produced through research from the university are properly disseminated and used by the respective end users. The change in mission of African universities should include the mission and vision of making research and knowledge produced to be properly disseminated and by extension ensure research uptake in the universities and the country as a whole.

The new mission has led African universities to enroll more doctoral students which is similar to that other universities in the developed world and selected South African universities. However, the numbers of PhD students are still small.



Furthermore, the new missions of universities in developed countries was created with the necessary government backing; the passing of various legislations and availability of necessary funds from government and the private sector. In Africa that isn't the case. The new missions have been created by universities that have been autonomous and less reliant on funding from their governments. The above will make it difficult for African universities to achieve this new mission.

## CHAPTER 2

### WORLD CLASS UNIVERSITIES AND AFRICA

#### 2.1 Introduction

The missions and visions of universities all over the world have evolved over the years. What has come to be known as “World class university (WCU)” has become the new catch all phrase describing leading universities of the world. However, most criteria for defining a WCU include high quality doctoral education; PhD enrolment and graduation and cutting edge doctoral research in these universities. In short, doctoral studies is a core part of any WCU.

Doctoral studies are a big resource to contribute to knowledge which by extension helps in creating new product development, new professional practice and the development of new technologies. In addition, doctoral education lies at the core of a university’s research capacity and is also seen as the primary source of research productivity and innovation in the global knowledge economy (Nerad & Heggeland, 2008).

Not surprisingly, recent strategic plans and research policies of selected African universities are focused on making them either WCU or providers of World Class (WC) services:

The new vision of the University of Ibadan (2014) is:

“...To be a world-class institution for academic excellence geared towards meeting societal needs.”

That of the University of Botswana (2013) is

“The University of Botswana is to be a leading academic centre of excellence in Africa and the world.”

The University of Dar es Salaam (UDSM) Vision (2011)

“To become a reputable world-class university that is responsive to national, regional and global development needs through engagement in dynamic knowledge creation and application.”

With the University of Nairobi having its new vision as: (2013)

“... is to be a world-class university committed to scholarly excellence.”

This chapter begins by discussing the different definitions of “WCU”. Other terms or synonyms such as “flagship universities”, “leading universities”, “and research intensive universities” are

also discussed. Other key different operational measures or indicators used to define WCUs are also highlighted.

The chapter also discusses the context of the recent discourse around world-class universities, the purpose of this debate about *WCU* as well as the driving forces for this debate. The review details some of the key drivers of the concept of *WCU*: Globalisation; world university rankings; and Internationalisation of higher education. The later sections of this chapter present two main arguments on why Africa should have world class universities. In all of these discussions, the centrality of research is highlighted especially at the postgraduate level.

The concluding section of this chapter summarises the arguments and definitions on *WCU* and concludes that except for selected universities in Africa especially South Africa and Egypt, African universities are far from attaining *WCU* status. The main objective of the chapter is to explore the opportunities and challenges involved in setting up globally competitive universities (also called “world-class,” “elite,” or “flagship” universities) in Africa that will be expected to compete effectively with the rest of the world’s best universities. Doctoral studies as a core mission of any *WCU* will be explored later in the chapter. In line with this the chapter also highlights some of the external and internal but complementary dimensions to reaching this feat.

## **2.2 Defining “World Class University”**

In the past decade, the term *world-class university* has become a catch all phrase describing universities at the pinnacle of the tertiary education hierarchy. According to Altbach (2004), no one knows what a world-class university is, and no one has figured out how to get one. However, since 2004, several authors (Sharma, 2005; Deem, Mok and Lucas, 2008; Brown 2013) have tried to “define” world class university.

According to Krishnan (2005) it is easier to define a ‘world class university’ as an ideal university. Krishnan (2005) defines an ideal university as a hothouse of ideas and scholarship. Ideas hold sway over authority and their refutation is attempted through the scientific method, not the heavy hand of hierarchy. Scepticism and critical examination are important principles to be upheld on a university campus. Each researcher has the freedom to work on the problems of his interest. All decisions regarding academic matters (interpreted in the broadest sense) are taken by the community of scholars. In addition, funding of research projects is on a competitive basis, subject only to peer review. Faculty build their reputations and are

promoted for the quality of their research and ideas (as achieved very successfully by the US tenure system), not for their seniority or proximity to the powers that be. The research system in a WCU creates freedom for researchers to undertake any type of research (applied or basic) but also ensures proper system of evaluation and accountability.

Deem, Mok and Lucas (2007) noted that the criteria for declaring or defining a WCU vary and include research; internationalisation; and teaching but rarely based on good governance, resources or autonomy. In addition, established universities make stronger claims to WCU status. The notion of a WCU is widely used by many higher education institutions either as a descriptor or as an objective and on league tables and thus, an important element in both descriptors and objectives (Deem, 2008).

The United Kingdom's (UK) Department for Business, Innovation and Skills, (2009) describes WCU as "...unique national assets, and must be recognised as such". However, Brown (2013) believes that there appears to be no universally agreed definition to what is a WCU. The institutions referred to as WCU are "research-intensive", in that a significant proportion of their income is for research—that significantly surpass their local, and most of their international, peers in resources, reputation and esteem.

These "research-intensive" universities are able to attract the best staff and the best qualified students. They are also magnets for private investment in research. In countries where private donations are common, they absorb a high proportion of the available pool. They are often public universities, or dependent on public as well as private funding. They are a very stable set: it is very hard for less favoured institutions to gain entry to this particular club, which does not, of course, stop them from trying (Brown, 2013).

In an attempt to propose a more manageable definition of world-class universities, a report by Altbach and Salmi, (2011) to the World Bank makes the case that the superior results of these institutions i.e. WCU (*includes highly sought graduates, leading-edge research, and technology transfer*) can essentially be attributed to three complementary sets of factors:

1. a high concentration of talent (faculty and students);
2. abundant resources to offer a rich learning environment and to conduct advanced research; and
3. favourable governance features that encourage strategic vision, innovation, and flexibility and that enable institutions to make decisions and to manage resources without being encumbered by bureaucracy.

On the first point of high concentration of talents, WCUs are able to select the best students and attract the most qualified professors and researchers. The high concentration of talent has always been the hallmark of the Ivy League universities in the United States and the Universities of Oxford and Cambridge University in the United Kingdom and it is also a feature of the newer world-class universities, such as the National University of Singapore (NUS) or Tsinghua University in China (Altbach and Salmi, 2011).

A comparative analysis of the Shanghai Jiao Tong University (SJTU) rankings of U.S. and Western European universities confirms that level of expenditures is one of the key determinants of performance. Total spending on tertiary education (public and private) represents 3.3 percent of gross domestic product (GDP) in the United States versus only 1.3 percent in the 25 European Union (EU) countries. Per student spending is about US\$54,000 in the United States, compared with US\$13,500 in the European Union (Aghion *et al.*, 2008). Similarly, there are large spending variations among European universities that are correlated with the rankings results of the respective countries. The United Kingdom and Switzerland have relatively well-funded universities and achieve the highest country scores in terms of rankings, while universities from the southern European countries, including France and Germany, have lower ranking scores associated with low levels of funding (Aghion *et al.*, 2007).

The third dimension concerns the overall regulatory framework, the competitive environment, and the degree of academic and managerial autonomy that universities enjoy.

The Economist (2005) refers to the tertiary education system in the United States as “the best in the world” and attributes this success not only to its wealth but also to its relative independence from the state, the competitive spirit that encompasses every aspect of it, and its ability to make academic work and production relevant and useful to society. The report observes that the environment in which universities operate fosters competitiveness, unrestrained scientific inquiry, critical thinking, innovation, and creativity.

The Economist definition of a WCU is mainly linked to the conducive environment which these universities operate in. It believes the environment a university operates in is critical to the research outputs from such universities. Many universities in the developed world have challenges with the environment they work. In Nigeria, universities do not have even reliable power supply. To become WCU, the environment that universities in Africa operate in should be improved. Doctoral studies facilities also need to be established in places where they are non-existing and improved in universities where there are basic facilities for doctoral research.

On the regulatory framework, the comparative study of European and U.S. universities mentioned earlier also found that governance was, along with funding, the other main determinant of rankings. “European universities suffer from poor governance, insufficient autonomy and often perverse incentives” (Aghion *et al.* 2007).

Another paper reporting on a survey of European universities found that research performance was positively linked to the degree of autonomy of the universities in the sample, especially with regard to budget management, the ability to hire faculty and staff, and the freedom to set salaries (Aghion *et al.*, 2008). With respect to the composition of university boards, the report concludes that “having significant outside representation on the board may be a necessary condition to ensure that dynamic reforms taking into account long-term institutional interests can be decided upon without undue delay.”

However, Altbach and Salmi (2011) points out that the autonomy elements outlined above are necessary, though not sufficient, to establish and maintain WCU. Other crucial governance features are needed, such as inspirational and persistent leaders; a strong strategic vision of where the institution is going; a philosophy of success and excellence; and a culture of constant reflection, organisational learning, and change.

Jeongwoo (2013) defines WCU by its characteristics. He mentions that, the designation of WCU is generally given to universities at the apex of an academic reputation and quality hierarchy in the global higher education market. In addition, their universities share more similarities with each other and above all, have the following characteristics:

1. International (a university which’s activities are not limited to its national boundaries);
2. Research intensive (a university that have high proportions of carefully selected top academic scholars reflect their academic reputation and strength in research);
3. Technologically smart and resource intensive (because these universities need up to date infrastructure, such as scientific laboratories and equipment, information technology, access to global knowledge and large interdisciplinary research team);  
and
4. Institutionally autonomous (because that encourages (or discourages) universities to fulfil their intended academic goals).

To Douglass (2014), a WCU is one that have highly ranked research output, a culture of excellence, great facilities, a brand name that transcends national borders and most importantly, sit in the upper echelons of one or more world rankings generated each year by non-profit and for-profit entities.

Other keywords used to define WCU include “*elite*” or “*flagship*” or “research” or “research-intensive” and “highly ranked” universities.

Research universities (RU’s) are integral parts of the global higher education and societal environment (OECD, 2009; Altbach, Reisberg and Rumbley 2010). RU’s are Key 21st-century realities for tertiary education worldwide including the massification of enrolment, the role of the private sector and the privatisation of public higher education, the ongoing debate concerning public versus private good in higher education, the rise of Asian countries as academic centres, and, quite recently, the global economic crisis and its effect on higher education (Altbach, 2009).

According to Salmi (2009), RU’s stand at the centre of the 21st-century global knowledge economy and serve as flagships for post-secondary education worldwide. They are elite, complex institutions with multiple academic and societal roles. They provide the key link between global science and scholarship, and a nation’s scientific and knowledge system. In addition, RUs produce much of the new information and analysis that not only leads to important advances in technology but also contributes, just as significantly, to better understanding of the human condition through the social sciences and humanities. They are both national institutions that contribute to culture, technology, and society and international institutions that link to global intellectual and scientific trends. They are truly central institutions of the global knowledge of society (Salmi 2009).

In the Centre for Higher Education Transformation (CHET) in Africa report (2013), the Director, Nico Cloete, also gives the definition of RU. He defines RU as *an academic institution committed to the creation and dissemination of knowledge, in a range of disciplines and fields, and featuring the appropriate laboratories, libraries and other infrastructure that permit teaching and research at the highest possible level*. Worldwide, RUs play complex roles in the academic system, including the core mission of research production and the training of students to engage in research. To Nico Cloete:

“.. The research university is not an ivory tower and is relevant to the wider community; much of its research is carried out in collaboration with funding and sponsorship from non-university sources. The research university is a highly complex and multifaceted

institution serving many societal roles. Research universities worldwide have a great deal in common, stemming from a specific tradition and from serving similar roles (CHET, 2013: 35)".

A research university is elite and meritocratic in such areas as hiring and admissions policies, promotion standards, and degree requirements for staff members and students.

Research universities cannot be democratic; they recognise the primacy of merit, and their decisions are based on a relentless pursuit of excellence. At the same time, they are elite institutions in the sense that they aspire to be the best—as often reflected in a top ranking—in teaching, research, and participation in the global knowledge network (Altbach, 2009).

The highest-ranked universities are the ones that make significant contributions to the advancement of knowledge through research, teach with the most innovative curricula and pedagogical methods under the most conducive circumstances, make research an integral component of undergraduate teaching, and produce graduates who stand out because of their success in intensely competitive arenas during their education and (more importantly) after graduation. It is these concrete accomplishments and the international reputation associated with these sustained achievements that make these institutions world-class (Salmi and Liu 2009).

Although the research university is a central institution in the knowledge economy, it is also an institution that must allow time for reflection and critique and for a consideration of culture, religion, society and values. The spirit of the RU is open to ideas and willing to challenge established orthodoxies. These RUs provide advanced education for the academic profession, policy makers and public and private sector professionals involved in the complex, globalised economies of the 21st century. In addition to their contribution to economic development, these universities play a key societal role by serving as cultural institutions, centres for social commentary and criticism, and intellectual hubs (Altbach and Salmi, 2011).

Within the tertiary education system, RUs play a critical role in training the professionals, high-level specialists, scientists, and researchers needed by the economy and in generating new knowledge in support of the national innovation system (World Bank 2002).

Another term which has been used to describe WCU is “flagship” university (FU).



In 1998, Robert Berdahl, former Chancellor of the University of California, Berkeley, notes that the use of the term “flagship” to describe any university was seen by some as “elitist and boastful”. He defines FU’s as fully mature public universities serving most of the states in the USA. In most cases, these institutions were the first public universities to be established in their states and formed the core of the public systems of higher education in their respective states and countries. In addition, Berdahl mentions that in the USA, the term “flagship” universities came to be associated with these institutions primarily after the Second World War, largely in the 1960s, when the country underwent its second enormous expansion of higher education. During this period two things happened. First, *in many states, branch campuses of the primary universities were established in the cities. The original university builders had been suspicious of the cities, with their sinful distractions, so earliest university campuses were located in rural, bucolic settings.* Second, *during the 1960s, various institutions were grouped together into “systems.” The creation of systems was impelled by three primary forces. First, and this drove the other two forces, was simply the enormous expansion of the college-age and the college-seeking population (Berdahl, 1998).*

FU’s in Japan are defined as select, top national, and private research universities –namely, the seven former imperial universities (Tokyo, Kyoto, Hokkaido, Tohoku, Nagoya, Osaka, and Kyushu); the Tokyo Institute of Technology (the top national university in engineering); and three leading private universities (Keio, Waseda, and Ritsumeikan). FU’s are mostly public and national universities (Yonezawa, 2006).

According to CHET, a FU should have “flagship” goals built into the vision and missions of the FU. The goals of most African FU include:

- having a high academic rating, which would make it a world-class university or at least a leading or premier university in Africa;
- being a centre for academic excellence;
- engaging in high-quality research and scholarship; and
- Delivering knowledge products which will enhance both national and regional development.

The problem with most FU’s in Africa is that they still cannot engage in high-quality research and scholarship. Most of the research conducted are very basic and do not answer or solve critical questions and problems. In addition, these universities lack the necessary facilities and faculty needed to conduct “cutting-edge” research as those conducted in FUs in the USA and Japan.

In addition, for Africa's FUs to be true WCU's, they need to step up their activities of delivering knowledge products which will enhance both national and regional development. Although some of these universities have over the years delivered on some knowledge products (for example, in increasing agricultural production), they still have not found solution to basic health problems such as cholera, malaria and Ebola. FUs in Europe keep finding solutions to several health and agricultural challenges facing Africa.

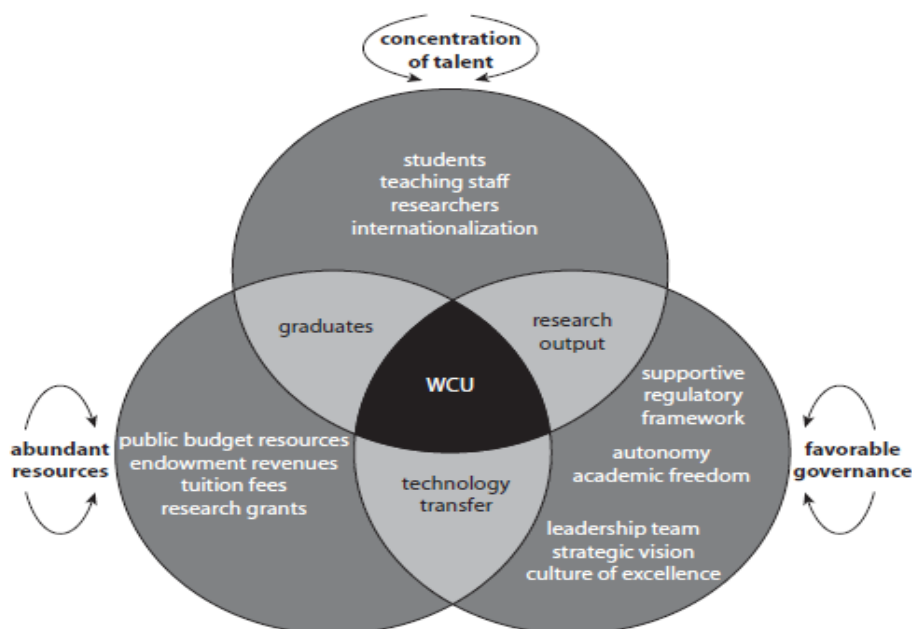
Overall, several authors Altbach, (2004); Deem *at al.*, (2009); Jamil, (2009) and Altbach & Jamil (2011), equated WCU with top research institutions, Carey (2007) presents a different view.

Carey (2007) asserts "*It is important to note that although WC institutions are commonly equated with top research universities, there are also world-class tertiary education institutions that are neither research focused nor operate as universities in the strictest interpretation of the term.* The United Kingdom (U.K) Open University, for example, is widely recognised as the premier distance education institution in the world, and yet it does not make the international rankings. Conestoga College in Ontario, Canada, is ranked as the best community college in Canada, and in Germany, the Fachhochschulen of Mannheim and Bremen have outstanding reputations. In the United States, a new ranking of community colleges, based on the quality of teaching and learning, seems to imply that the top institutions, at the least, outperform some of the best four-year universities in the country".

WCUs also tend to have a high proportion of carefully selected graduate students reflecting their strength in research and the fact that graduate students are closely involved in the research activities of these institutions. In most cases WCUs have students and faculty who are not exclusively from the country where the university operates. This enables them to attract the most talented people, no matter where they come from, and open themselves to new ideas and approaches.

With the proliferation of league tables in recent times more systematic ways of identifying and classifying WCU have appeared (Institute for Higher Education Policy [IHEP] 2007). Notwithstanding the serious methodological limitations of any ranking exercise (Salmi and Saroyan 2007), WCUs are recognized in part for their superior outputs. They produce well-qualified graduates who are in high demand on the labour market; they conduct leading-edge research published in top scientific journals; and in the case of science-and-technology-oriented institutions, they contribute to technical innovations through patents and licenses. Most universities recognised as WC originate from a very small number of countries, mostly

Western (Shown in Figure 2.1). In fact, the University of Tokyo is the only non-U.S., non-U.K. University among the top 20 in the SJTU ranking.



Source: Salmi 2009.  
Note: WCU = world-class university.

**Figure 2.1 Characteristics of a World-Class University: Alignment of Key Factors**

According to Alden and Lin (2004) any university classified as WCU should have the following characteristics:

1. Has an international reputation for its research;
2. Has an international reputation for its teaching;
3. Has a number of research stars and world leaders in their fields;
4. Is recognized not only by other world-class universities (for example, U.S. Ivy League) but also outside the world of higher education;
5. Has a number of world-class departments (that is, not necessarily all);
6. Identifies and builds on its research strengths and has a distinctive reputation and focus (that is, its “lead” subjects);
7. Generates innovative ideas and produces basic and applied research in abundance;
8. Produces ground breaking research output recognized by peers and prizes (for example, Nobel Prize winners);
9. Attracts the most able students and produces the best graduates;
10. Can attract and retain the best staff;

11. Can recruit staff and students from an international market;
12. Attracts a high proportion of postgraduate students, both taught and research;
13. Attracts a high proportion of students from overseas;
14. Operates within a global market and is international in many activities (for example, research links, student and staff exchanges, and throughput of visitors of international standing);
15. Has a very sound financial base;
16. Receives large endowment capital and income;
17. Has diversified sources of income (for example, government, private companies sector, research income, and overseas student fees);
18. Provides a high-quality and supportive research and educational environment for both its staff and its students (for example, high-quality buildings and facilities/high-quality campus);
19. Has a first-class management team with strategic vision and implementation plans;
20. Produces graduates who end up in positions of influence and/or power (that is, movers and shakers such as prime ministers and presidents);
21. Often has a long history of superior achievement (for example, the Universities of Oxford and Cambridge in the United Kingdom and Harvard University in the United States);
22. Makes a big contribution to society and our times;
23. Continually benchmarks with top universities and departments worldwide; and
24. Has the confidence to set its own agenda.

Deem (2008) however questions if world class equal being highly ranked in league tables. She asserts that since there is a profusion of league tables, clearly not every institution looks for a league table in which it can come top. In addition, what goes up must come down implying positioning on the league tables are fragile. The concept implies selectivity but the number of claimants to WCU status makes it seem universal. Truly being world class only matters to a tiny number of universities but pretending to be WC matters to many more.

Salmi (2009) agrees that becoming a member of the exclusive group of world-class universities is not achieved by self-declaration; rather, elite status is conferred by the outside world on the basis of international recognition.

In conclusion, this section has tried to look at the various definition of a *WCU* and the meaning of other names used to label *WCU*. Although some of the authors (Krishnan, 2014) and experts (Deem, Mok and Lucas, 2007; and Brown, 2013) have been able to define what a

WCU is, others (Alden and Lin, 2004; Jeongwoo, 2013; and Douglass, 2014) have defined a WCU by its characteristics. The characteristics of WCUs makes them very unique.

In addition, these universities' main focus and mission is to conduct cutting edge basic and applied research and by so doing earn the admiration of industries and other stakeholders. They attract additional funds for their research and other activities based on outcome from their research. Their research is focused more on delivering knowledge products to solve critical problems. The financial base of WCUs are sound and solid. WCUs have sound governance and accountability structures that help to sustain their activity and be accountable to their nation and its people. Their relevance among the community of nations; stakeholders in education and regional bodies is well felt. It can also be concluded that from the various debate and arguments, WCU concept is new but it has come to stay.

### **2.3 The origins of the debate on WCU's**

The definitions of a WCU have been within the context of university research and the position of universities in the worldwide university rankings. According to Salmi and Saroyan (2007), it is the rankings that define what the WCU is to the broadest audience and that the rankings cannot be ignored by anyone interested in measuring the performance of tertiary education. Until the early 2000's, the process of being labelled a WCU involved a subjective qualification, mostly that of reputation. It was the Ivy League Universities in the United States (U.S.), such as Harvard, Yale, and Columbia; the Universities of Oxford and Cambridge in the United Kingdom (U.K.); and the University of Tokyo which have traditionally been counted among the exclusive group of elite universities, but no direct and rigorous measure was available to substantiate their superior status in terms of training of graduates, research output, and technology transfer (Altbach and Jamil, 2009).

The IHEP (2007) report notes that with the proliferation of university rankings systems over the past few years, however, more systematic ways of identifying and classifying world-class universities have appeared. Although most of the best-known rankings purport to categorise universities within a given country, there have also been attempts to establish international rankings. The two most comprehensive international rankings, allowing for broad benchmark comparisons of institutions across national borders, are those prepared by (a) the Times Higher Education Supplement (THES), produced by QS Quacquarelli Symonds Ltd., and (b) Shanghai Jiao Tong University (SJTU). A third international ranking compiled by Webometrics, produced by the Cybermetrics Lab (a unit of the National Research Council, the main public research body in Spain), compares 4,000 world tertiary education institutions and marks them

on scales from 1 to 5 across several areas that purport to measure visibility on the Internet as a proxy of the importance of the concerned institution. Lastly, Leiden Ranking, which is a ranking of universities based on bibliometric indicators of publication output, citation impact, and scientific collaboration. The ranking includes 500 major universities from 41 different countries.

According to Jeongwoo (2013) the notion of the WCU emerged in response to the process of globalisation and the advent of the international university rankings. These forces have forced universities from the national to the global stage. It has also made research universities more significant as educational services and programmes have become globalised and a global market has emerged for knowledge, high-technology products, and intellectual labour. In addition, because of the power of rankings, institutions are playing a game of innovation and investing in light of ranking methodologies, perhaps at the expense of their real strengths, financial capabilities, and institutional capacity: They are doing all these to achieve a WCU status.

Douglass (2014) mentions that a direct correlation exists between the emergence of international rankings of universities and the pervasive rhetoric and obsession with the WCU status. Douglass (ibid) continues that these rankings were built on a model first ventured by commercial rankings of colleges and universities in the U.S. as consumer guides for prospective students, international rankings based on similar formulas made their appearance around 2004.

The period after the release of the ranking saw government ministries focused increasingly on universities as a path to economic development and their self-assessed need for some collection of top, research-intensive universities. They quickly embraced rankings as a quantifiable source for assessing the place of their universities in the global marketplace.

University administrators and academic scholars have also embraced the language of WCU and the focus on rankings, essentially reinforcing a paradigm that focuses on a narrow band of activities, largely international measures of research productivity.

In Salmi (2011) article on “Nine Common Errors When Building a New World-Class University”, he notes that:

“..... In the past decade, the term “world-class university” has become a catch all phrase to describe research universities at the pinnacle of the tertiary education hierarchy, as measured by the various international rankings. Around the world, governments have responded to this global reputational competition with additional

funding to promote their national elite universities, as illustrated by the various “Excellence Initiatives” in countries as varied as China, Denmark, Germany, Nigeria, Russia, South Korea, Spain and Taiwan. In some cases, the government has also encouraged its top universities to merge so as to achieve economies of scale, and reach a better position to compete globally. A few countries have even decided to establish new universities from scratch, with the explicit purpose of creating world-class institutions (International Higher Education, 2011: 5)”

The Authors (Altbach and Salmi, 20011; Douglass, 2014; Salmi, 2010; Jeongwoo, 2013; IHEP, 2007; and Salmi & Saroyan, 2007) and institution (IHEP, 2007) quoted above have linked the debate and emergence of WCU concept to the appearance of the world universities ranking. It is therefore important to understand the factors that necessitated the global ranking of universities. The ranking of global universities emerged after a lot of talk and discussions about globalisation and internalisation at the end of the 20<sup>th</sup> century.

The issue of having WCU's according to Brown (2013) emerged as a result of globalisation, increasing global competition and international rankings and because of that an increasing number of countries are putting resources into creating or safeguarding elite institutions. This is done either directly or, more often, through initiatives aimed at creating ‘centres of excellence’. In addition, WCU's may provide a benchmark for others to aim at. Undoubtedly they contribute to national prestige.

The evolution of *globalisation* and of the knowledge society has led to systemic and institutional changes in higher education systems, and has required universities to adapt their character and functions to meet complex societal demands and expectations (Mok and Welch 2003). According to Scott (2006), the university is the pivotal institution in the rapidly globalising, postmodern environment because it produces (research mission) and transmits (teaching and public service missions) the bulk of society's new information.

Another concept or factor that is linked to the WCU concept is the mission of *internationalisation*. As an emerging mission of the university, internationalisation, or service to the body of nation-states, involves the multiple missions of teaching, research, and public service or nationalisation. Frequently, internationalist and nationalist goals may conflict due to economic, political or cultural differences. Despite the complexities, an apparent convergence of higher education policies is now afoot worldwide.



Internationalisation of higher education can also be defined as 'the process of integrating an international, intercultural, and global dimension into the purpose, functions (teaching, research and service) and the delivery of higher education' (Knight, 2004).

Internationalisation of African universities since the 2000 has taken place in many forms and activities. In addition, drivers of Higher Education (HE) internalisation in Africa include *the availability of ICT infrastructure; the development of curriculum, teaching and learning up to international standards; the use of English as the major language of instruction and the internationalisation of universities programmes home and abroad* (Jowi, 2013).

Kerr (1994) distinguishes four main aspects of internationalisation: the flow of new information, faculty members, students, and curricular content. This process is stimulated by an apparent convergence of higher education structures and policies worldwide. These main aspects of internationalisation are core characteristics of WCUs.

One way of accelerating the transformation into a world-class university is to use internationalisation strategies effectively. An influx of top foreign students can be instrumental in upgrading the academic level of the student population and enriching the quality of the learning experience through the multicultural dimension. In this regard, the capacity to offer programmes in a foreign language, especially English, can be a powerful attraction factor. Among the 100 top universities according to the SJTU ranking (since 2003), 11 come from non-native-English-speaking countries where some graduate programmes are offered in English (Denmark, Finland, Israel, the Netherlands, Norway, Sweden, and Switzerland) (Salmi, 2009).

It is obvious that the emergence of the rankings prompted universities to look at their status within the global community. Universities then adopted the indicators used in ranking universities globally.

#### **2.4 Arguments in favour of WCU's in Africa**

The discussions on the need for countries to own or establish WCU began at the dawn of the 21<sup>st</sup> century. However, Africa as a continent has not featured much in the debate for countries to establish WCU (Aghion *et al.*, 2007; Alden and Lin, 2004; Altbach, 2004; Altbach, 2003; Altbach, 2005; Deem and Lucas, 2008; Harman and Harman, 2008; Niland 2000; Usher 2009; and Jalmi 2009). These authors mostly classify African countries as part of developing



countries and do not single it out as a unique continent with its unique challenges in higher education.

Cloete *et al* (2011) posit that research universities in low- and middle-income countries (of which many are in Africa) have a crucial role to play in developing differentiated and effective academic systems, and in making it possible for their countries to join the global knowledge society and to compete in sophisticated knowledge economies. While research universities in the developing world have not yet ascended to the top levels of the global rankings, they are important in their countries and regions – and are steadily improving their reputations and competitiveness on the international stage. A key point is that research universities around the world are part of an active community of institutions that share values, foci and missions.

Deem (2008) in discussing *who/what is excluded from world class status* mentioned the following as items left out on the discussion of WCU:

- Most universities in the developing world;
- Open access/open source publications;
- Publications not written in English;
- Universities without international academics and students;
- Capacity building in the developing world; and
- Institutions with a local or regional mission

Universities in developing countries (especially Africa except for selected universities in South Africa which mostly appear among the top globally ranked universities and Nigeria which aspires to build WCUs) have been left out of the debate.

These authors (Aghion *et al.*, 2007; Alden and Lin, 2004; Altbach, 2004; Altbach, 2003; Altbach, 2005; Deem and Lucas, 2008; Harman and Harman, 2008; Niland 2000; Usher 2009; and Jalmi 2009) believe amongst other things that the steps involved in establishing a WCU are very demanding and comes at a huge cost which African universities and their governments are not ready for. According to Wang, Wang and Liu (2011), in 1996, during its centennial, Shanghai Jiao Tong University (SJTU) put forward a “three-step” plan to develop into a world-class research university by the mid-21st century. Since then, the university has been continuously creating and modifying a series of institutional strategic plans. The individual schools and departments were also required to create their specific development programmes. SJTU put in a lot of effort and reforms within its entire university system and structure in order to create a WCU, something which is lacking in most universities in Africa.

As part of Shanghai Jiao Tong University (SJTU) strategic planning of making it a WCU, it denoted 2004 as “the year of strategy planning” and produced a policy for 2010 that focused on the medium- and long-term development of the university to become a comprehensive, research oriented, internationalised higher education institution. The steps toward achieving world-class status include laying a solid foundation for SJTU’s further development into a research university by 2010, “breaking into” the top 100 ranking of universities by 2020, and achieving its overall world-class status and being well-positioned in the top 100 by 2050. Since 1998, SJTU has progressively developed in the areas of disciplinary development, teaching and research, science innovation, faculty quality and financial resources.

Unlike STJU and other universities in developing countries in Asia and South Africa which have short, mid and long terms plans of creating WCU, most African universities have a short term plan (Oyewole, 2009) and often do not plan adequately. Most universities in Africa see the creation of a WCU university easier than how WCUs have been defined.

For example, Tijani<sup>2</sup> in his paper “*Developing World Class Universities in Nigeria: Challenges, Prospects and Implications*” argues that Nigeria can establish twenty WCUs by the year 2020 Tijani (2013). According to Tijani (2013), to be able to establish or sustain a —World Class University in Nigeria —there must be an unwavering focus on the factors, structures, processes, services and minimum quality standards that characterise a university worthy of that exalted name.

He further explains that Nigeria can learn and sincerely dissect and adapt what makes Oxford or Harvard great and WC, rather than wanting to reinvent them in Nigeria. In addition, the governing body of universities in Nigeria should set guidelines and encourage Nigerian universities to be the best they can and that each institution should identify the pathway to accomplishing its goals and aspiration by creating a niche for itself.

On other factors that characterises a WCU, Tijani (2013) states that favourable governance, for instance, is elusive in most failed states and remained suspect in stable and emerging developing nations like Nigeria. There is absence of abundance resources because promises are common at fanfares that celebrates opening of new universities. The culture of endowment is mostly absent, and where it exists, corrupt officials use the opportunity to become

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<sup>2</sup> Professor Tijani is a Fellow, Royal Historical Society, UK and the pioneer Dean, Faculty of Arts and Education, Adeleke University, Ede, Osun State, Nigeria

billionaires overnight. There is a continuous dichotomy or divergence between teachers, staff, and students

Tijani concludes in his paper that:

“..... It suffices to say that a —world class institution is attainable in Nigeria, though there are many grey areas that need to be retooled for excellence. Despite the problem of defining the phrase —world class university – it has come to stay; it is the vogue worldwide describing the epitome of excellence, recognition and success. The benchmark for creating a —world class university should include an utmost sincerity that entails dedication to realising goals, vision, and philosophy of the institution. It connotes being relevant through service and research that benefits the transformation agenda of the nation. It means research and publication is not just for promotion, but also for eventual glory of the institution, the nation, and the global community. It involves student mentoring, and modelling of ethics, morality, and service to the institution, the nation, and the world. It is about everyone engaging in service that would show case production of knowledge, dissemination of knowledge, and the usefulness of knowledge nationally and internationally. This implies that Nigerian universities should not only be research-intensive, but must evolve the best pedagogy for teaching the content across disciplines. It should be noted that publication of body of knowledge should not be concentrated in non-peer review or self-publishing press. The library and Internet access must be at par with standard worldwide creating avenues for research and teaching of contents across disciplines (Tijani 2013: p22).”

The University of Ghana strategic plan to be become a WCU is a short term one (University of Ghana, 2014) and not a long term like universities in China, Japan and even South Africa. The reasons for African universities aspiring for WCU status in the short term may be justified but may mainly be due to their definition of what the WCU is and also the indicators of the global university ranking they are working at improving.

Tijani defines a WCU as:

“...—a centre of excellence where missions and goals are mixed with sincere implementation of plans, emphasising —we and —our rather than —I. It is a centre where teaching is paramount, pedagogy is constantly refined to meet the needs of students, and practical modelling across disciplines critically engaged them to utilise resources on campus and outside the campus. It is an environment where research is not for self-aggrandisement, rather for the use of all. The teaching of the body of knowledge and the production of knowledge transcends itself; it is often times a joint accomplishment between the teacher-scholar and students. Lastly, I define a —world class university as a physical and non-physical space that provides opportunities for all; teaching and non-teaching, and the community are often engaged in debates,

dialogue, and discourse that are beneficial to the entire nation. The output of body of knowledge is not local, but international and accessible to all.'

His definition of a WCU has some characteristics of the definitions given by experts in section 1.3. However, his definition leaves out critical characteristics of WCUs such as highly ranked institution; having an alumni who is a Noble Peace Prize laureate; publications are highly cited; have an annual research funds over millions of US dollars and have research as core part of university mandate. These factors are very difficult for African universities to achieve but easy if their governments have political will to invest in higher education.

Also in making his case on "How does the University of Ghana become a Research University?" the Vice Chancellor Professor Aryeetey uses the Carnegie Institution of Higher Education (CHIE) definition of what and types of Research University should look like. The CHIE describes two types of research universities; the extensive and intensive institutions. The extensive institutions are those that award 50 or more doctoral degrees per year across at least 15 disciplines and the intensive institutions award at least 10 doctoral degrees per year across three or more disciplines or at least 20 doctoral degrees per year overall (Presentation Material, Workshop on Transforming the University of Ghana into a Research University, April 2013).

Per Aryeetey's definition, there is just one factor or parameter the University of Ghana needs to satisfy to become a research intensive university: number of PhD produced a year. The above makes it easier for African policy makers in higher education to fill the continent needs or have WCUs.

Whilst experts in the field of higher education have left Africa out, African universities believe they can obtain world class status if proper arrangements are put in place between their national governments and the donor agencies. The vision of most top universities in Africa is to become WCU within the next two decades. For instance, the University of Ghana strategic Plan 2014 -2020 aims to achieve a WCU status if not within the world, at least in Africa. In addition, The University of Zambia Strategic Plan 2013 -2017 aims to make the university a WCU by 2017.

Again in 2015 "top research universities" in Africa have also formed an alliance to help realise their goal of become WC research universities. The Alliance involves fifteen universities from eight African countries. The focus of the group will be to build African research excellence as

a “vital precondition” for the continent to develop and exert control over its future (MacGregor, 2015).

The alliance follows in the footsteps and shares the aims of other research university consortiums around the world – such as the League of European Research Universities and the Group of Eight in Australia – that advocate for strengthening research and postgraduate training in higher education. The universities include Lagos, Ibadan and Obafemi Awolowo in Nigeria, the University of Ghana, Makerere University in Uganda, the University of Nairobi in Kenya, the University of Dar es Salaam in Tanzania, the National University of Rwanda, Université Cheikh Anta Diop in Senegal, and in South Africa the universities of the Witwatersrand, Cape Town, Stellenbosch, Pretoria, KwaZulu-Natal and Rhodes.

African universities, with their several challenges, were for a long period pursuing the primary or core function of teaching until the early 2000’s when there was a global shift in the role and missions of universities. The drivers for such policies are rather common across the countries. Supporting or developing a world-class university is considered by many to be a necessary and unavoidable step to become competitive at a global level (Ramphela, 2004; Bloom et al., 2006). This is evident in the new mission and vision statements of most top African flagship universities (University of Botswana, University of Cape Town, University of Dar es Salaam; University of Ghana; amongst other) which have embedded broad WCU goals in their mission and vision.

Of the several concepts which necessitated the shift in missions of African universities, it is the concept of having a ‘world-class university’ which most African universities embraced. For instance, in redefining its new mission, the University of Ghana states that: “.... It would aspire to move closer to some of the world renowned universities which have achieved world class status through cutting edge research” (UG, 2012).

Universities in Africa began to shift their missions by developing strategic plans for the next decade with the main focus of becoming “world-class universities”.

The University of Ghana goes further to give its definition of a World Class University as:

“..... One with faculty members doing first-rate research, in the basic sciences to the applied as in the hybridisation and manipulations of genomes of organisms as well as the ability to secure international and collaborative funding. The faculty members should be widely cited and associated to important discoveries, thus attracting other talented researchers and students around the world” (UG, 2012).

In addition,

“..... World Class University has technology transfer high on the agenda which in turn spins out companies and consequently is in a position to train manpower to man these companies. World class universities generate ideas, for example, development of new crop varieties or production of sustainable energy sources that the citizenry depend on. Attributes of a university engaging in cutting edge research which advances knowledge is its ability to train responsible and reasonable students capable of making informed decisions based on independent scientific bases and who are in high demand in academia as well as in industry both locally and abroad” (UG, 2012).

The University of Zambia Strategic Plan 2013 -2017 has it that:

“Thus this five-year plan, which partly builds upon our previous Strategic Plan, focuses on repositioning the University of Zambia by transforming the challenges arising from the merging competitive era into ultimate opportunities for exploitation. The Plan summarises our priorities and sets out a series of programmes and projects that we believe will transform the University into ‘A Provider of World Class Services in Higher Education and Knowledge Generation (University of Zambia, 2012: p2)”

According to Materu *et al* (2011), the advent of world rankings of universities in the past half-decade (2005–10) has ignited in Nigerian educational institutions the desire to compete and benchmark their institutions. Even though the value and parameters of rankings can be contested, the fact that no Nigerian university has ever been featured among the top institutions was a wake-up call, both within the universities and in the wider society. Nigerians have since begun to benchmark their universities against those of South Africa, which have occupied the top of the ranking table on the African continent.

The University of Ibadan strategic plan for 2009– 2014 provides the road map for achieving the vision of a world-class institution with academic excellence geared toward meeting societal needs (University of Ibadan, 2009). In the framework, the University has identified 12 strategic issues that will drive the overall strategic plan. Some priority issues mentioned in the strategic plan include establishing an effective and efficient governance structure and management process; developing an environment that is conducive to teaching and learning and that promotes the development of excellence and innovation; and having globally competitive and locally relevant programmes geared toward making it a WCU.

Throughout the years, the University of Ibadan was able to maintain partnerships with several universities, donor agencies and development organisations around the world. To lead the

efforts toward internationalisation, the university has also established the Office of International Programmes. Its mission is to enhance global awareness among staff members and students, expand the international composition of the University of Ibadan, promote a reputable international presence, and showcase the University of Ibadan's role as a leading institution in Africa. To accomplish the mission, the centre engages in coordinating and supporting international academic programmes, generating and disseminating information on international opportunities, promoting and sustaining international partnerships, and advocating the internationalisation of facilities and programmes (University of Ibadan, 2010).

Another argument that has been put across for the need for Africa to have WCU is the recent economic growth seen in selected African countries. Ghana anticipates an average economic growth rate of 6 to 8 percent which would propel it to a prosperous, upper middle income country status by the year 2020. Other African countries such as Nigeria, Namibia, Rwanda and Senegal also anticipate strong economic growth over the next five years. Aryeetey argues that all over the world, creative research is the basis to support innovative industry. He further mentions that the role of the University in the provision of relevant skills to the labour market; the capacity to assess existing knowledge in science and technology, particularly for agriculture; the capability to assess existing information and generate new understanding through research; and a much closer working relationship with productive sectors of the economy is critical to achieving the above national objectives. He concludes that:

“.....In sum at the time that Ghana and some African universities need solid research outcomes to guide its future socioeconomic development, it is obvious that the capacity of its higher educational system to deliver such outcomes is severely constrained. This is why the need for a WCU is urgent” (Aryeetey, 2013: 4)

In summary, African Universities are gradually modifying their missions and focus in attempt to be recognized as WCUs. However, the approaches until now have predominantly been short term in nature and their definition of the WCU concept seems to differ from the global perspective. It is therefore uncertain whether attainment of WCU by African universities per their definition will warrant attainment of WCU status at the global level.



## 2.5 Relevance of the WCU debate for African universities

Smaller countries may have only one Research University, whereas larger nations may have many, although they are only a minority of the total tertiary education institutions in African countries. This implies that African countries must have at least one WCU within each country, provided the universities and their respective governments are committed to this course. So for instance Tijani (2013) mentions that Nigeria needs just three (3) WCUs.

African universities' research suffers from a deficit of effective organisation and management. In addition, not only is there lack of vision; appropriate policy frameworks and strategic planning; but also the lack of a service culture within the structures responsible for administering, coordinating and promoting research. With heavy teaching responsibilities, professors have little time for research and prefer consultancy work to improve their salaries. The state is reluctant to finance research, and lecturers are often reluctant to use their research allowance for the intended purpose (Camara and Toure, 2010). Camara and Toure (ibid) are hopeful that due to recent improvements in the overall governance amongst some "high" placed universities in Africa and the establishment of multidisciplinary and inter-faculty doctoral schools are contributing to more interactions among researchers and students. They maintain that such improvement will also see African universities rise to the level of WCU. In short Camara and Toure (2010) believe the WCU debate is or will see the rise in the improvement of infrastructure the overall governance of African universities.

Komla (2011) however presents a different view. The author mentions that the new 'global academic order (i.e. WCU)' mentioned by Wildavsky (2010:3) is rife with inequality and the scramble to 'globalise' higher education which strongly favours universities from the United States, Europe and other English-speaking advanced industrial countries. Moreover, the author cited Altbach (2007) and mentioned that the world university rankings are such extreme asymmetries and demarcate a profound inequality between the academic 'core' and a vast number of 'peripheral institutions,' many of them found in the previously colonised world.

African universities have been on the periphery of the global discussion on WCU, however, it has institutions such as the University of Cape Town and Stellenbosch University, both in South Africa which are ranked among the top universities of the world. This means that African universities have not been absolutely left on the peripheral but can strive to become WCUs. In addition, with the socioeconomic and developmental challenges facing the continent of Africa, the mandate and mission for a WCU in Africa should be more Africa focused.



African universities believe that establishing world class universities will make them relevant in the new global knowledge, placing them at the levels of universities in the West/Europe and China.

These should also be accompanied with increase in number of publications in journals cited in international indexes. Achieving a world class status will also increase their chances of better collaboration with highly ranked universities as well as increase their chances to attract and access sources of research and project funds from donors and other universities. These funds will improve African universities research and give them the necessary support to get better equipment for their science laboratories (Altbach and Salmi, 2011).

On university rankings, African universities believe achieving a WCU status comes with being placed high in the world university rankings which currently have just 3 to 5 universities from South Africa ranked in the top 500 universities in the world (THES, 2014).

In addition, having WCU in Africa will reduce the “brain-drain” of its experts from Africa. Thus according to Altbach (2009), professors in research universities tend to be international in their consciousness and often in their work. They increasingly collaborate with colleagues in different countries and are sometimes internationally mobile, accepting jobs where working conditions, salaries and facilities are best. This situation contributes to a “brain drain” from developing countries.

Over the years, commitment of African universities in tackling the various challenges facing the continent has been called to question. Universities in Africa have-not lived up to the earlier missions and visions why they were created (which has been extensively discussed in chapter one). The creation of world class universities in Africa will bring universities in Africa to the global stage but more importantly improve on their research and find lasting solution to most of the continents problems. Research intensive universities in Africa will help Africa increase its number of publications which currently stands at less than 2 percentage of global publications in most international indexes. WCUs attract the best faculty and students (which in most cases have Africans among them). Creating a WCU in Africa, will reduce brain drain amongst African scholars and create brain gain into universities in Africa. African universities lack accountability and autonomy, the creation of a WCU in Africa, will ensure universities are more accountable and have the needed autonomy to undertake their core mandate of research and teaching.

## 2.6 Arguments against WCU's in Africa

Africa as a continent has not featured much in the debate for countries to establish WCU (Aghion *et al*, 2007; Alden and Lin, 2004; Altbach, 2004; Altbach, 2003; Altbach, 2005; Deem and Lucas, 2008; Harman and Harman, 2008, Niland, 2000; Usher, 2009; and Jalmi, 2009). Their discussions and debate on WCUs have mainly focused on the top ranked universities in the USA, Europe and most recently Asia. Except for Douglass (2014) who mentions Nigeria and Altbach & Salmi (2011) who mentions South Africa and Nigeria in the debate of creation WCU. Africa as a continent has been on the periphery of global higher education reforms. This could be due to most of the arguments noted in section 1.4 above and which will be discussed in depth in the sections below.

Firstly, Altbach, (2011) notes research universities conduct research in many fields and disciplines. They are the main sources of basic research, joined in a few countries by private corporations (such as pharmaceutical companies) and scientific academies, and thus have key responsibility for the scientific advancement. Basic research is a quintessential public-good function; no one earns a direct profit from basic science. Moreover, fundamental research, particularly in the hard sciences and biomedical fields, is often expensive.

The often expensive nature of research in the field of science and biomedical sciences leaves African universities on the periphery. African universities still have fundamental challenges to the “normal” funding of their core university activities and programmes (Benneh, 2002; Task Force on Higher Education, 2000; World Bank, 2008). It will therefore not have the needed funds to support other key research in the field of the sciences and biomedical sciences.

From the Africa Innovation Outlook (2010), apart from South Africa, there are two countries that stand out in this comparison: Malawi and Uganda. Both countries have an R&D density (GERD/GDP ratio) of over 1% (1.70% and 1.10%, respectively). For the other countries, the percentages range from 0.20% to 0.48% as shown in Table 2. 1.

**Table 2.1 Gross domestic expenditure on R&D (GERD) (2007/08)**

	Year	GERD million PPP\$	GERD per capita PPP\$	GERD as % of GDP
Gabon	2008	78.7	58.3	0.47
Ghana	2007	120.1	5.0	0.38
Kenya	2007	277.8	7.4	0.48
Malawi	2007	180.1	12.9	1.70
Mali†	2007	37.4	3.0	0.28
Mozambique*‡	2007	42.9	2.0	0.25
Nigeria*†	2007	583.2	3.9	0.20
Senegal	2008	99.0	8.0	0.48
South Africa	2007	4 976.6	102.4	1.05
Tanzania*	2007	234.6	5.8	0.48
Uganda†	2007	359.8	11.6	1.10
Zambia	2008	55.3	4.6	0.37

Sources: ASTII R&amp;D Surveys; PPP data from UNDP (2010); population and GDP data from AfDB (2010)

Note:

\* Data do not include the business enterprise sector

† Data do not include private non-profit institutions/organisations

‡ Data do not include the higher education sector

African universities in the 21<sup>st</sup> century still struggle with funding for basic research and cannot afford carrying out applied research. According to Altbach and Jamil (2011), central to the success of a research university is adequate and stable funding. Research universities will increasingly be challenged to raise their own funds from potential donors, through the sale of intellectual products and consultancy and increasingly from student tuition and fees.

Secondly, some of the characteristics of successful research for WCU, are defined by their placement in top echelons of the global university rankings. Since the inception of the worldwide university rankings, except for selected universities in South Africa, no university in Africa has appeared within the top 500. It will take time for most of these African universities to appear in the top 500 universities, which means if African universities will use the rankings as a benchmark for achieving a WCU status, it may not appear in the top ranked universities in the not distant future.

Throughout the various ranking tables, it is obvious that less than 5 universities in Africa appear among the best and highly ranked universities in the world. African universities have therefore been advised not to seek the WCU status. Experts have argued that per the positions of African universities in the global universities ranking, they are nowhere near being labelled as WCU. In addition, the rankings will let African universities lose sight of other

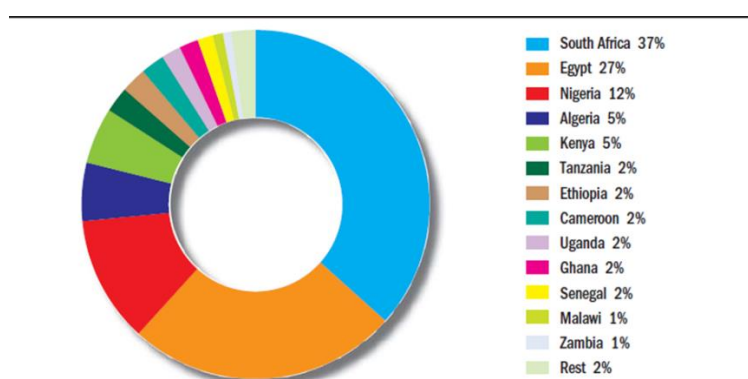
indicators/characteristics of world class which they need to work on to improve their status among global universities.

Another argument that has discouraged African universities from seeking WC status is the scientific outputs from their institutions. In his analysis of science research output in Africa, Tijssen (2007) shows how sub-Saharan Africa has fallen behind quite dramatically in its contribution to world science output: from 1% in 1987 to 0.7% in 1996. Mouton (2010) notes that the diminishing shares of African science overall do not reflect a decrease in an absolute sense, but rather increasing publication output that has grown more slowly than the international growth rate. Africa has lost 11% of its share of global science since its peak in 1987; sub-Saharan science has lost almost a third (31%) of its output.

Mouton (2010) further notes that the countries in North Africa – Egypt and the Maghreb countries (Algeria, Mauritania, Libya, Morocco and Tunisia) – accounted for the modest growth in the African share of worldwide output during the period 1998–2002. The decline of sub-Saharan science can partly be attributed to discarding African journals from the citation indexes.

Figure 2.2 presents the differential contribution to total research output of the 13 most productive countries among the 19 countries in the study. The breakdown shows the dominance of South Africa (37%) and Egypt (27%), as well as the significant contributions of Nigeria (12%), Algeria (5%) and Kenya (5%) (Africa Innovation Outlook, 2010).

To Sawahel (2010), Africa's contribution to global research output is concentrated in three countries- Egypt in the north, Nigeria in the middle, and South Africa in the south.



**Figure 2.2 Contribution share of individual countries (top 13) to total research output (n = 236 567 papers)**

Most of these publications are from universities and research centres in Africa. However, the average scientific output from Africa is minimal compared to that of countries in Europe and the BRICS countries. Between 2005 –2009, Greece had an average annual output of 10371; South Africa- 6476; South Korea – 29883; and Brazil 25880 ((Africa Innovation Outlook,2010).

If African universities are to become world class, there will be a need for them to publish more as other universities in the Europe and the USA. This may be difficult for most universities in Africa where researchers publish mainly for promotion and also in local journals. In addition is the issue of African scientists publishing with predatory outlets.

RU or WCU's also require physical facilities commensurate with their missions, which means expensive teaching spaces, libraries and laboratories. Sophisticated information technology is also required. The infrastructure of research universities are both complex and expensive to maintain and periodically upgraded. Overall, except the highly ranked universities in South Africa, most universities in Africa lacks basic infrastructure including inadequate and out dated lecture rooms, unreliable internet services, old and irrelevant articles and books in the university libraries amongst others.

In a CREST report commissioned by Southern African Regional Universities Association in 2008, the authors states that:

“..... Numerous studies have been conducted over the past 10 – 15 years that demonstrate quite convincingly that research at former well-resourced and supported institutions such as Makerere University in Uganda, Ibadan in Nigeria and University of Dar es Salaam in Tanzania have deteriorated; that research infrastructure and the general state of laboratories at many institutions has suffered from a lack of maintenance and timely replacement of old equipment. In addition, the generally poor quality of library resources has not improved significantly with many university libraries not even using automated management systems; the demand for sufficient research funding for ongoing research and scholarship continues as does the need for proper research management and support at most of these institutions (Southern African Regional Universities Association, 2008: 12).

Students and researchers in African universities mostly do not have access to electronic journals and electronic databases. Museums are not considered as part of the science system and therefore are non-existent in most African universities. Since African universities lack the basic infrastructure, it will not be appropriate and timely to strive for a WCU status.

*Another reason African universities are disadvantaged regarding becoming WCU is the issue of globalisation.* Globalisation is both a benefit and a curse to research universities (Knight 2008; Marginson and van der Wendi 2009). Research universities are at the centre of global knowledge communication and networks. They funnel new ideas and knowledge into the higher education system and the country as well, and they permit the academic community to participate in international science and scholarship. At the same time, for many universities in Africa, globalisation in Africa constitutes a challenge. The global academic market place for professors and students means that the best students and staff members can be enticed away. Over reliance on international core journals for promotion and research criteria may place professors in peripheral research universities at a disadvantage. Globalisation tends to favour universities at the centre over others; it does not necessarily contribute to the democratisation of science and scholarship (Altbach, & Salmi, 2011).

African universities do not have long-term visions as needed in the establishment of WCU. The strategic plans of most of the universities on the path of transformation to WCU's are mostly a 5-year plan (University of Ghana, 2012; University of Zambia, 2012 and the University of Ibadan, 2007). In addition, most countries in Africa do not tie their countries' overall economic and social development to that of the university. Universities in Africa operate more on their own and mainly involve government on issues of financing. Governments in Africa have also questioned the universities overall involvement in policy and eradicating the social problems including hunger and diseases. The different positions held by key stakeholders of HE in Africa, make experts doubt if the two can work together in creating WCU.

Most countries on the path of transforming their universities into WCU status have plans for the development of other types of tertiary education institutions to build an integrated system of teaching, research and technology- oriented institutions. This is not the case with most African governments. New universities being established in Africa are private which mostly belong to churches and individuals. The above reasons make some experts question whether Africa is really ready or on the path of transforming its universities into world class status.

As countries embark on the task of establishing world-class universities, they must also consider the need to create, besides research universities, excellent alternative institutions to meet the wide range of education and training needs that the tertiary education system is expected to satisfy. The above is not the priority of most African countries. Governments have stopped building new tertiary institutions because they are currently struggling to maintain the old universities.

Sharma (2005) argues that developing countries in Africa and India as a country cannot match up with the politics involved in WCU rankings and that there is no need for them to aspire to get there. Sharma (ibid) states that “it is an open secret that Nobel prizes are extremely politicised and that a scholar like Amartya Sen was awarded the Nobel Prize in Economics but is it not unfair that J. Bhagwat has not been considered for the prize yet”.

Despite the profound economic, scientific, and academic advantages of internationalisation, regionalisation of African universities may come at a greater cost. Most damaging can be the loss of distinctive cultural heritages in the pursuit of universalism. Komla (2011) notes that African universities quest to become World Class Universities will make them lose their heritage and that universities need to define what WCU status is in the context of an “African world class university”. Such a university should incorporate African culture and studies into its curriculum. In trying to establish WCUs in Africa, universities have to internationalise their activities including their curricula. Opponents who argue against Africa having WCUs believes the internalisation of the African universities mission will let the university and the graduates lose sight of their African heritage. WCU in Africa should be “Africanised” by having some curricula and other activates tailored towards Africa history, culture and values (Goosen and Hall 1989; File, 1993; Gibbons *et al*, 1994; Macfarlane, 2011; Mamdani, 1995; Pillay, 1998; Taylor and Taylor, 2010; and Wildavsky, 2010).

Quality continues to be a problematic and elusive issue not only in the international dimension of higher education in Africa but within the entire university education system (Otieno and Huisman, 2008). To Otieno and Huisman (2008) the quality of curricula and training at African universities is still localised and in some cases do not meet international standards. On the issue of research, African universities still carry out mostly basic research and findings of their research published in journals which are not highly cited. For African universities to be truly internationalised (which is a driver for WCU status) they will need to review their curricula by making it more internationalised.

To deal with most of the obstacles that African universities needs to tackle in order to attain world-class status, it needs money. Funding of HE in Africa continues to be the major challenges for most governments and universities. It has left universities as structural disadvantages; created internal tensions; made universities lack research capacity; and cannot hire high quality faculty and students. To create a WCU in Africa, universities in Africa need reliable source of funding in all areas. According to Palfreyman and Tapper (2009), in countries that worry about the relative international visibility of their flagship universities and desire to help them actually achieve WC status are increasing their public taxpayer financing



of research in their leading universities. Douglass (2014) and Sadlak and Liu (2007) mention that to create a WCU you will need an annual threshold cost of USD 1.5 billion to carry out cutting edge research, an amount almost all African universities can't afford. Altbach (2004) notes, it might take more than \$500 million along with clever leadership and much good luck to create a WCU.

The standard measure of the R&D intensity of a country is the ratio of Gross expenditure on R&D (GERD) to Gross Domestic Product (GDP). Most developing countries view 1.0% as the gold standard.

Overall, the authors who argue against establishing WCU's in Africa claim that the continent and its universities do not meet the major conditions which are central to achieving WCU status. With the introduction of university fees in most African universities and lack of scholarship to attract good talents (especially experienced professors and good postgraduate students) for the universities, African universities are nowhere achieving World class status.

## **2.7 The Role of Doctoral education in attaining World Class University Status in Africa**

Doctoral studies are a big resource to contribute to knowledge which by extension helps in creating new product development, new professional practice and the development of new technologies. In addition, doctoral education lies at the core of a university's research capacity and is also seen as the primary source of research productivity and innovation in the global knowledge economy (Nerad & Heggeland, 2008).

In an article entitled 'The rise and rise of PhDs as standard', Morgan (2011) quotes Wendy Piatt, Director-General of the Russell Group (UK) of larger research-intensive universities:

"The vast majority of (our) academics [...] have doctorates. There may be some slight variation according to discipline, but academics without a doctorate would be very much in a tiny minority. This has been the case at Russell Group universities for many years. Providing a first-class teaching and learning experience is vitally important to our universities. (Piatt 2011, in Morgan 2011: 1)"

If knowledge and information are the new electricity of the economy, then it is a reasonable assumption that the university – as the main knowledge institution in society – will become increasingly important and that its apex training product, the PhD, will appear on the skills radar (Times Literary Supplement 2013).

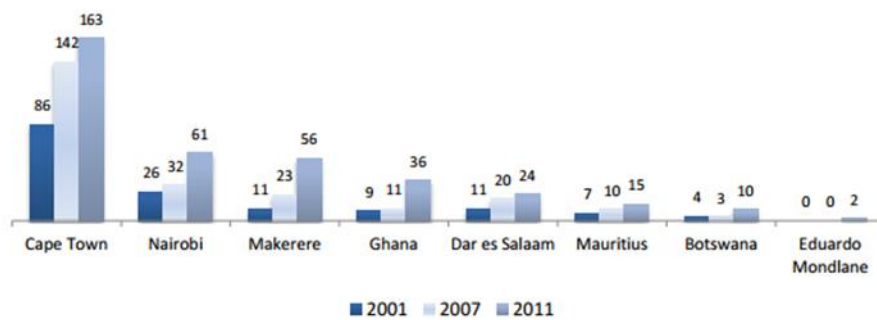


African universities have had a long history of postgraduate studies with the major focus on training graduates at postgraduate diploma's and later Masters degrees. For instance, in Ghana, the earliest attempt to introduce postgraduate studies started in 1952 at the University College of the Gold Coast, now known as the University of Ghana, fourteen years after it was founded in 1948 and after the successful introduction of a number of undergraduate programmes. By the 1963-1964 academic year, all existing departments, except the School of Administration, now known as the University of Ghana Business School, had either established two-year Master of Arts (MA) and Master of Science (M.Sc.) degree courses or had started compiling syllabuses for master's degree programmes (Agbodeka, 1998).

This initial effort received a further boost by 1970 when it became necessary to establish a nexus between postgraduate studies and research, with postgraduate studies as the driving force for the development of research in the University. A Postgraduate Studies Committee was constituted "to consider the whole question of postgraduate studies in the University and to make recommendations". The committee recommended the introduction of Masters and Doctor of Philosophy degree programmes in all departments, taking into consideration the establishment of specialist libraries, equipment and teaching staff requirements. It is evidently clear that apart from South Africa which has an already established doctoral education system before the year 2000, most postgraduate education in Africa ended at the masters' level.

Statistics from selected universities across Africa (again, apart from South Africa) show that post graduate enrolment and graduation has been low before the year 2001.

Figure 2.3 summarises total doctoral graduate over the period 2001-2011 for selected African Universities. The doctoral graduate total of the eight universities rose from 154 in 2001 to 367 in 2011. University of Cape Town, University of Nairobi and Makerere University all together produced 80% of the doctoral graduate total of the eight universities in 2001, 82% of the total in 2007, and 76% in 2011 (Cloete *et al* 2011). It is also worth noting from figure 2.3 that some universities who were not noted for graduating a lot of Doctoral candidates hitherto seen tremendous increase in Doctoral graduates in recent times. It is evident from Figure 2.3 that in terms of percentage increase in Doctoral graduates from 2007 to 2011 the university of Botswana has seen the greatest increase (approximately 233%), followed by the University of Ghana (approximately 277%), Makerere (143%), Nairobi (90%), Mauritius (50%), Cape Town (14%) in that order.



**Figure 2.3 Doctoral graduates from 8 African Flagship universities (Source: Cloete et al, 2011)**

Universities in Africa have recognised the need to train more highly qualified graduates for their countries which are becoming emerging economies and also to compete with other universities in the world in the production of knowledge. The trends have even changed from just producing masters but then PhDs. To Cloete, Mouton and Sheppard (2015), recent times however doctoral studies has focused on the increasingly important role that higher education-particularly high-level skills is perceived to play in the knowledge economy (KE) instead the traditional of PhD, has namely be the provision of a future supply of academics. But the PhD is not just a possible contributor to talent in the knowledge economy – it is also regarded as crucial for improving quality in the university system.

Reasons for the special attention increasingly being given to doctoral education across the world although almost the same in the broader sense, the reasons differ nationally and regionally. The position that doctoral training is undertaken either for traditional academic purposes or for commercial labour markets does not take into consideration the fact that the process of doctoral training in the US is integral to the global knowledge economy. For example, the PhD arena in the US is no longer a male-dominated enterprise benefiting US citizens alone. In 1966, US-born white males received 71% of science and engineering PhDs, US-born females earned 6% of those degrees and foreign-born students received 23% (Bound et al. 2009).

In Brazil, the objective of training more PhDs according to the country's then President Dilma Rousseff was “not to produce “75 000 Einsteins”” but instead to build ‘a knowledge base in the country; that these students return and with their capacity and training and transform the know-how and innovation of the country’ (Rousseff 2011, in Hennigan 2011: online).

In Africa, however, the notion of training more PhD's, in the words of by Prof. Is-haq Oloyede (Chair of the International Association of Universities (IAU)) "has been to importance of supervision and career development for university and national advancement, and called for more synergy and collaboration to broaden the development of doctoral education in African universities" (Cloete, Mouton and Sheppard (2015).

At a two-day workshop on "Expanding and sustaining excellence in doctoral programmes in sub-Saharan Africa: what needs to be done" in South Africa in November 2013, there was agreement that Africa needs tens of thousands more PhDs in order to renew an ageing professoriate and staff, rapidly expand higher education, boost research and generate high-level skills for growing economies in Africa (MacGregor 2013b). In addition, across the African continent, there is a strong need to support PhD training. The gathering identified the African Union, the Association of African Universities, leading African philanthropists and donors as potential partners in this regard. Participants and the organisers noted that nationally and regionally, governments, regional higher-education and research networks and institutions need to acknowledge and promote PhDs.

However, Cloete, Mouton and Sheppard, (2015) assert that despite the absence of a coordinated policy focus, a strong emphasis on the production of more doctoral graduates emerged in the post-2008 period. For a start, the South Africa Department of Science and Technology (DST) set initial targets for PhD production, as described in its Ten-Year Innovation Plan: 'To build a knowledge-based economy positioned between developed and developing countries, South Africa will need to increase its PhD production rate by a factor of about five over the next 10 to 20 years' (DST 2008: 29).

The international discourse on the doctorate is largely about the contribution to and place of the PhD graduate in the knowledge economy. There are two strands to this debate. One is about strengthening the university as knowledge producer. In this approach, increasing the number of doctorates is part of the link between high-level research training, disseminating new knowledge through international networks (such as conferences, journals and books) and linking to research and development in different ways through an innovation cycle. In this sense it is both about strengthening the university (and specifically the quality it produces) and contributing to the knowledge economy (Cloete, Mouton and Sheppard, 2015).

Cloete, Mouton and Sheppard, (2015) further assert that the second aspect is the doctorate as a contributor to 'talentism', meaning the global search for talent identification. In this sense, it is concerned with high-level skills, both research and analytical, outside the university, be it

within industry or the public sector. The debates, rather ironically, are about whether there are too many doctoral graduates (at least in the USA) and the impact on the higher education system. Elsewhere, such as in Europe, and particularly as exemplified in Germany, discussion centres around continued competition for doctoral students and the increasing mobility of such graduates. If the lens is focused on the PhD for academic positions primarily, then the debate addresses supply and demand in the academic labour market. However, if the focus is on the knowledge economy outside the university, then there is little concern about labour market absorption since the global market is endless.

Whilst the discourse has been on the above, it is also certain that other factors which Cloete, Mouton and Shepaprd, 2015 has labelled as “external demand factors such as global and international (such as rankings),” have also influenced universities in Africa and the developing countries to produce more PhDs. These include the change in the missions and visions of universities in Africa and other developing countries and their quest to become World class universities.

It is widely known that China’s policy of developing world-class universities is underpinned by its view that education providing for high-level skills is central to economic growth (Shen 2013). However, other countries that are following massive expansion policies are Singapore (‘growth in all directions’), which has experienced a 60% growth over a five-year period, and India (Cloete, Mouton and Shepaprd, 2015).

In its recent strategy to boost its economy’s scientific base, Brazil offered 75 000 grants in 2011 – to be allocated by the end of 2014 – to science students keen to study abroad (Hennigan 2011). The aim of this “Science Without Frontiers” programme is to increase the number of Brazilian pre- and post-doctoral students in leading foreign institutions (Hennigan 2011).

WCU is a research-intensive university; attracts the best talents of postgraduate students and undertakes cutting edge research. Most African universities especially those universities in the continent’s emerging economies (including Ghana, Kenya, Nigeria, Senegal and Mauritius) have their new missions and strategic plans to become world class universities by the year 2024 (UG Strategic Plan (2014 -2024); University of Zambia Strategic Plan (2012 - 2017) and University of Ibadan Strategic Plan (2012- 2017). The University of Ibadan even goes a step further to develop a Strategic plan for Staff Recruitment, Development & Retention in line with its mission to become a world class university and in that document states that:

“..... The NUC has pronounced the PhD degree as the minimum qualification for an academic career in Nigerian universities and that increase in the number of staff members who complete their doctoral in a particular year.

.... And in doing the above, the university will improve its research profile and quality teaching staff (UB Staff Recruitment, Development & Retention (2012 -2017, p7)”.

In the new University of Ghana Strategic Plan 2014 -2024, it mentions that its strategic objective is to:

“.....Support PhD training for cohort of lecturers without PhDs and phase out old system of lecturers without PhDs. At least 85% of the faculty in all departments should have PhDs by 2018”

The Strategic plan also mentions as one of the Major pillars of the strategy over the plan period will be to:

“Grow the numbers of graduate students, especially at the PhD level, to ensure a ratio of 50:50 (undergraduate/graduate) by the end of the plan period.”

The questions and critiques from the other side of the debates also point to the fact that, the emergence and call for African universities to produce more graduates are more of the external demands discussed above. It could thus be argued that in Africa the call for increasing doctoral production is without an economic context. It is not part of an agreed-upon role for the university in economic development, and as the International Association of Universities (IAU) and the Association of Catalan Public Universities(ACUP) [IAU-ACUP] report concludes, while the status of the PhD is acknowledged, African society does not seem to know how to evaluate its usefulness to development (IAU-ACUP 2012: 20). This raises the question as to whether the demand for more PhDs is not based on a reference to the diaspora and the specific need to produce well-qualified academics to compensate for the brain drain.

Maslen (2013) mentions that African governments are beginning to ask if it is time to slow the PhD production line. This stems from a recognition that many PhD graduates are unable to find academic positions and that a high proportion of those who do may find themselves working in casual or part-time appointments. He further notes that at the Higher Education two-day workshop in South Africa in 2013, the experts and governments agreed that the way that PhD education in Africa is conceptualised and delivered needs to be realigned to African-led priorities. Many African universities cannot carry out their research mandates effectively and under-development has placed limits on the flourishing of postgraduate education, affecting PhDs especially.

What is striking here is how developing countries are making huge investments in the knowledge economy, with increasing doctoral production being one of the conditions for membership of the knowledge economy. On analysis, two groups emerge: on the one hand, South Korea, Singapore, Taiwan and Mexico, all acknowledged members, if not leaders in the knowledge economy, and all countries where the doctoral output is already high; and then, on the other hand, the BRICS (Brazil, Russia, India, China and South Africa), particularly China, Brazil and India, whose governments are formulating targeted policies and making huge investments in increasing doctoral and research output as part of their effort to improve their positions in the global rankings by catching up within the knowledge economy (Cloete, Mouton and Sheppard, 2015).

Generally African universities production of PhD is very small compared to other developing countries like Brazil, China and India. Fast-developing countries are growing doctoral output at more than 7%, with Mexico (17%) and China (40%) increasing at astronomical rates (Cloete, Mouton and Sheppard, 2015).

IAU-ACUP (2012: 6) indicates that Universities in Africa have identified the challenges in developing and promoting doctoral education which include:

- Shortage of funding (for students and institutions);
- Low institutional capacity;
- Diversity and duplication of programmes;
- Poor quality supervision;
- Inadequate responsiveness to national, social and economic needs;
- Weak links to industry;
- Lack of academic freedom; and
- Lack of international information-sharing. (IAU-ACUP 2012: 6)

The universities are making efforts with key stakeholders to tackle these challenges.

Despite the challenges, African universities have plans to increase their PhD production and nothing will stop that mission in the immediate future. Overall, there has been important progress towards revitalising the traditional roles and missions of African universities for which doctoral studies form a core of their current mandate. However, achieving world class university status demands increased doctoral research than is currently being done. Beyond this the contribution of doctoral research to the developmental needs of Africa ought to be paramount.

However, what is left out of the debate in African universities producing more PhDs and also becoming WCU is the issue of the utilisation and uptake of PhD research findings into practice and policy. For every PhD research, the core aim of the research undertaken is to add new knowledge to the body of existing knowledge. This means as more PhDs are produced new knowledge will be added if the quality of research is also good. The utilization of knowledge from doctoral theses to the general body of knowledge which already exist has not been well studied (Gyekye, 2005; Manuh, Budu and Sulley, 2002; Nerad and Heggeland, 2008). It is clear that universities, in addition to their other missions of teaching and learning and community engagement, are significant sites for knowledge production in a country (Ewusi, 1986; Kerr, 2001; and Boateng, 2007). Through their teaching and research, new knowledge and refinements of existing knowledge are relayed into teaching, policy and production processes as well as into social life as a whole (Manuah and Sulley, 2003 and Twum- Barima, 1976). According to Crossman and Devisch (1999), and Sawyer (2004) universities are central to the knowledge systems. Sall *et al.*, (2003) adds that an important way in which universities affect society is through the quality of their teaching and research and the effectiveness of their contributions to policy, production and management, as well as to solving social problems.

Although Africa's universities continue to provide research and train researchers which is a key condition for its development, the uptake and utilization of the knowledge from such research is minimal (Sall *et al*, 2003; Twum-Barima, 1976; and Jebuni, 1998). Similarly, in Ghana, Doctoral research generates some knowledge which is relevant for the economy and national development but a critical problem is the uptake and the utilisation of this knowledge. This is particularly evident in the fields of natural and environmental sciences, which knowledge generated from doctoral research can help tackle some of the challenges the country is facing at the local and national level.

Doctoral research produces new knowledge. In addition, the main rationale for embarking on doctoral studies is to add new knowledge to the existing body of knowledge. The uptake of this knowledge is lacking. If findings of doctoral research are properly disseminated, it will improve the visibility of the universities. The publications from doctoral research work will also improve the overall research output of the universities. If the quality of doctoral thesis research is good and published in recognised journals, it will improve the citation impact of universities as done in WCU universities in the developed world. Overall, the uptake of doctoral research findings contribute to a university's effort of becoming a WCU.



## 2.8 Conclusions

African universities have a desire to become world class universities. To become WCU universities, they have changed their missions and in selected cases drawn up strategic plans to help them achieve that purpose.

To become world class universities, African universities should get the needed legislations from their parliaments to help them change their missions. In addition, universities in Africa should lobby their respective governments to support their efforts to become WCU. The support from government should not only be funds needed for their operations but also to ensure research accountability from the universities they support.

The creation of WCU universities in Africa can help solve many environmental and developmental challenges that confront the continent's people and their communities. WCU's will undertake original and cutting edge research that will solve the problems confronting the continent including poverty, disease, food insecurity and inequality.

However, governments and universities and research administrators need to recognise that doctoral education plays a critical role in them becoming WCU. PhD students will undertake the needed original research that the universities need. In recognising the role PhD education plays in African universities, challenges that confronts PhD studies in Africa such as lack of funding (which extends the duration of the studies); lack of supervisors and poor supervision of PhD students need to be tackled.

World Class Universities encourage the uptake of their doctoral research. Publications from theses; the discovery of new innovations and the patents generated from doctoral research in developed countries and research intensive universities make them world class. University administrators and professors in African universities should ensure that the research is relevant and original and that outputs from the research will not only be the theses but also the patents; discoveries and new ideas from the research. Overall, research uptake should be included in the general research value chains of African universities and their respective research systems.



## CHAPTER 3

### THE FIELD OF ENVIRONMENTAL AND NATURAL RESOURCE SCIENCES IN GHANA

#### 3.1 Introduction to the Chapter

This thesis focuses on PhD's in the field of environmental and natural resources sciences (ENRS). It is, therefore, only logical that we need to discuss in some detail what the field is, which post-graduate programmes are offered in this field as well as some features of the knowledge produced in the field.

#### 3.2 Definitions of Environmental and Natural Resource Science (ENRS)

The multidisciplinary and interdisciplinary nature of the field of environmental science and education have been mentioned by several authors (Cunningham and Saigo, 1995; Enger *et al*, 2005; and Singh, 2006). The field of Environmental Science (ES) is also an applied science. According to Singh (2006) the field of Environmental Science is multi-disciplinary in nature because it comprises various branches of studies such as chemistry, physics, medical science, life science, agriculture, public health, sanitary engineering amongst others, and it is the science of physical phenomena in the environment. Environmental Science also combines information from many disciplines such as geography, geology, economics, sociology, demography, cultural anthropology, resource management, law, politics, and ethics.

Environmental science is a multidisciplinary science with basic aspects having a direct relevance to every facet of the society. According to Cunningham and Saigo, (1995), the main aspects (disciplines) of environmental science are:

1. Conservation of nature and natural resources;
2. Conservation of biological diversity;
3. Control of environmental pollution;
4. Stabilization of human population and environment;
5. Social issues in relation to development and environment; and
6. Development of non-polluting renewable energy system and providing new dimension to nation's security

Studies in this field over the past years have dealt with analysis of the processes in water, air, land, soil and organisms which lead to pollution or degradation of the environment and by extension, generate environmental issues like global warming; depletion of the ozone layer; dwindling forest; energy resources; and loss of global biodiversity amongst others.

Enger *et al.*, (2005) notes that the field of Environmental Sciences also deal with important issues like safe and clean drinking water, hygienic living conditions and clean and fresh air, fertility of land, healthy food and sustainable development. In current times (i.e. at the beginning of the 21<sup>st</sup> century) fields like Sustainable Development, Environmental Law, Business Administration, Environmental Protection, Management and Environmental Engineering are emerging as new career opportunities for environmental protection and management of the environment.

At the University of Virginia ( <http://www.evsc.virginia.edu/academics/graduate/prospective-graduate-students/> ), the Department of Environmental Sciences (EVSC) offers instruction and conducts research in the areas of ecology, geosciences, hydrology, and atmospheric sciences. According to the EVSC, this unique juxtaposition of several sciences in one department fosters cooperation and exchange among traditional disciplines that share similar methodological and philosophical problems. The research endeavours of both faculty and graduate students, whether disciplinary or interdisciplinary, deal largely with problems of fundamental scientific interest. Research fields include environmental biogeochemistry, coastal processes, hydrogeology, catchment hydrology, microbial ecology, wetlands ecology, terrestrial ecology, boundary-layer meteorology, atmospheric chemistry, and climatology. Initiatives involving groups of faculty in contaminant hydrogeology, global environmental change, and coastal ecosystems encompass a number of graduate research opportunities.

Because of the multidisciplinary and interdisciplinary nature of the field, for instance, students pursuing Master of Philosophy in Environmental Science at the University of Ghana undertake courses in Environmental Geology; Environmental Law; Environmental Impact Assessment; Demographic and Population Studies; Geographical Information Systems (GIS); And Soil, Air and Water Quality amongst other. More than four faculties of the university are involved in teaching and supervision of postgraduate students' research work.

### **Is there an exact definition 'natural resource science'?**

To start with 'natural resources' include water, forests, rangeland, soil, minerals, fisheries and wildlife. Natural resource science, therefore, is the application of scientific principles and knowledge towards a better understanding and management of these resources (<http://www.tru.ca/science/programs/nrs.html> ).

According to the World Bank (2000), Natural Resources Management (NRM) refers to the sustainable utilisation of major natural resources, such as land, water, air, minerals, forests, fisheries and wild flora and fauna.

In addition, three persistent concerns are consistently raised regarding NRM, particularly in developing countries:

- Renewable resources are utilised beyond their regenerative capacity, which is especially troubling for the poor, whose resource-based tends to be narrow and less easily shifted geographically and sectorally;
- Non-renewable resources are depleted with insufficient savings in man-made, human, or social capital, and with minor benefits directed specifically to the poor
- The “sink” capacity of the environment is overburdened by pollution, which in turn damages human health and ecosystem functions. The poorest frequently pay the human price for this development.

The field of Natural Resource Studies has been defined by keywords such as: forest(s), Forestry, Conservation, Biodiversity Conservation, Non-Timber Forest Products and others.

In addition, in trying to give the various definitions and disciplines of study for the field of Natural Resource Science (NRS), universities have noted that the definition of 'natural resources' include water, forests, rangeland, soil, minerals, fisheries and wildlife. Natural Resource Science; therefore, is the application of scientific principles and knowledge towards a better understanding and management of these resources.

The University of Minnesota in the United States of America (<https://www.nrsm.umn.edu/about>), which is one of the few global universities running programme in NRS notes that the field includes courses such as wildlife biology and management, fire management, range management, fisheries research, forestry and ranching.

The Natural Resources Science and Management (NRSM) Graduate Programme (<https://www.nrsm.umn.edu/about>) at the University of Minnesota encompasses graduate course offerings from the Departments of Forest Resources; Bio-products and Bio-systems Engineering; Fisheries, Wildlife and Conservation Biology; as well as other units.

Stellenbosch University tags its postgraduate programme in Environmental Management as “A Multi-Disciplinary Programme with a Unique Selection of Core and Choice Modules from Four Faculties”. Students pursuing the programme are made to undertake science based courses in soil loss through wind and water, water quantity and quality, pollution on large and small scales, global warming, nuclear radiation, biological invaders, fragmentation and management of animal populations, loss of biodiversity, disruption of life supporting systems and the economics of environmental degradation as part of the module 1- Environmental Issues(<http://www.sun.ac.za/english/faculty/economy/spl/SPL%20Library/Prospectus%202016.pdf> ).

The definitions above show that the field of ENRS, both academically and professionally, is a broad interdisciplinary and multidisciplinary one. In adopting these definitions to this study, there will be the need to consider doctoral studies carried out in faculties, departments and units of the universities in Ghana.

### **3.3 Programmes of study in the Field of ENRS in Ghanaian Universities**

This section discusses the areas and disciplines of natural and environmental sciences studies and research conducted in the two main and oldest public universities in Ghana; the University of Ghana and Kwame Nkrumah University of Science and Technology. In addition, the discussion will give a brief overview of programmes run in other public universities.

The University of Ghana (UG) runs a Master of Philosophy and PhD in Environmental Science. The UG does not offer direct undergraduate programme that leads to the award of undergraduate degree in Natural Resource Science or Management. However, due to the broad and interdisciplinary nature of the field of ENRS, this study includes courses and programmes undertaken at other faculties of the university. In Ghana, most of the research conducted within the faculty of Science and Agriculture at the postgraduate level are mostly in relation to the Environment and Natural Resources.

The UG runs postgraduate programmes in Environmental Sciences; Fisheries science, Food Science, Earth Science, Petroleum geosciences, Marine Science, Nutrition; Oceanography; Statistics and Zoology. The Faculty of Science and the College of Agriculture runs ENRS related programmes including Botany and Biodiversity studies amongst others. In some cases, even postgraduate research in Physics and Mathematics are related to the environment science. For example, research works in climate change modelling and soil modelling.

The Kwame Nkrumah University of Science and Technology (KNUST), has two colleges for the field under study; College of Agriculture and Natural Resources, and College of Science.

The College of Agriculture and Natural Resources was established under statute 33 in October 2004, as one of the six colleges of the University, created under the collegiate system. Its mandate is to train, research and disseminate knowledge in sustainable agriculture, renewable natural resources management and rural development.

The College of Agriculture and Natural Resources through its departments runs graduate degree programmes (MSc, MPhil and PhD). Programmes which the college run and are related to the field of ENRS include: Plant Breeding, Crop Physiology, (Forage Production Management, and Weed Science in Agronomy Entomology, Plant Pathology, Nematology, and Plant Virology courses in Crop Protection, Soil Science. In addition, other courses such as Soil Management & Conservation, Soil Fertility/Plant Nutrition, and Forage Production Management in Animal Science are run by the College. Research conducted by most postgraduate students in several of the programmes of the College of Agriculture and Natural Resources are environmentally related.

Other postgraduate programmes run at the College of Agriculture and Natural Resources, KNUST, which are related to the field of ENRS include: Sustainable and Integrated Rural Development, Wildlife and Range Management, GISNATUREM (Natural Resources Management), Silviculture and Forest Management, Natural Resource and Environmental Governance, Silviculture and Forest Management. Natural Resource and Environmental Governance, Agroforestry, Wood Technology and Management, Aquaculture, Watershed and Fisheries Management, Aquatic Resources Management, Fisheries Management, Aquaculture Management and Aquaculture & Environment. In addition, the Faculty runs a separate postgraduate programme, GIS (Naturium), under the auspices of ITC Netherlands.

The College of Science at KNUST is one of six Colleges of the Kwame Nkrumah University of Science and Technology (KNUST). Originally established as the Faculty of Science in 1961, the College assumed its current status, following the restructuring of the University into six colleges in December 2004. The College is made up of two main Faculties and one Research Centre. It has approximately 150 academic staff and a student population of nearly 3500.

Postgraduate programme which the College runs in relation to ENRS include Climate Change at the Department of Physics; Environmental Science and other environmental and natural resource research in the related fields of chemistry and biological science.

In December 31, 2011, the University of Energy and Natural Resources (UENR), Sunyani, Ghana, was established by an Act of Parliament, Act 830, 2011. The University is to run programmes and research emphasising interdisciplinary collaboration and taking into account, areas such as economics, law and policy, management, science, technology and engineering as well as social and political issues affecting energy and natural resources. It has a School of Natural Resources which runs undergraduate programmes in Ecotourism; Wood Science and Forest Products; Social Forestry; and Land Reclamation and Restoration. The University has no graduate school and therefore does not run any postgraduate courses.

The other public universities in Ghana run similar programmes at the undergraduate and postgraduate levels in the ENRS.

Overall, Ghana runs several postgraduate programmes in the field of ENRS. The faculties within the two main universities which runs doctoral studies in these fields have produced the highest number of doctoral graduates since 2000. Doctoral enrolment in the ENRS programmes or related programmes keeps rising each year, which means that knowledge are generated from the various doctoral research.

### **3.4 Actors and Institutions of Environmental and Natural Resources Studies and Research in Ghana**

#### **3.4.1 Actors**

The management of natural resources in developing countries is an increasingly important driver for sustainable economic growth. It creates jobs and provides governments with revenue to deliver services to their citizens.

Ghana, like most countries in Africa, is endowed with a lot of natural and mineral resources including gold, timber and diamonds amongst others. Despite the abundant natural resource endowment, many African countries including Ghana are confronted with bad environmental practices and management practices. Environmental problems including poor waste management, water, land and air pollution by domestic and industrial activities are seen in all parts of the country. In addition, Ghana suffers from other environmental problems such as deforestation and wetland destruction to name a few.

This section identifies the actors and discusses their role in environmental and natural resource management studies. In explaining the meaning of environmental and natural resource management actors in this context, we take an example from the field of agriculture. In the field of agriculture, actors are individuals, such as small-scale and commercial farmers, members of the irrigation administration, extension staff, traditional and non-traditional authorities, district administrators, politicians amongst others with varying degrees of negotiation power that they can employ to pursue their vested interests in a given arena. Interests might be defined by economic rationalities but might be of political, social or altruistic nature too (Wolfram, 2007).

In Ghana's field of Environmental and Natural Science studies, the key actors include the lecturers and research fellows from the country's universities. The lecturers and research fellows are mandated to train and impart knowledge to students who enrol in these universities through teaching and research supervision. They also impact on societal developments through their research.

The next group of individuals who play a key role in environmental and natural resources studies in Ghana are the Research Scientists. The Research Scientists are mostly located within the institutions under the national research council and other international (Such as UNU, UNEP, IFDC, Solidaridad, Friends of the Earth, WWF (now NDF) amongst others) and recently the Environmental Protection Agency (EPA).

In Ghana, the national research council is known as the Council for Scientific and Industrial Research (CSIR). Scientists within the CSIR are mandated to carry out basic and applied research for national development. However, in recent times, they have also helped in supervising postgraduate students from the universities pursuing programmes related to the field of natural and environmental sciences.

In recent times, some Natural Resource NGOs and local organisations also have helped in supervising postgraduate students, provide scholarship for students in natural resource studies, and also support the research faculties at KNUST and UG. The United Nations University- Institute for Natural resources in Africa (UNU-INRA) has provided support to UDS on research relating to the field of ENRS in Ghana. The University of Ghana and KNUST has also received support from several international organisations based in Ghana including IFPRI and AGRA to train postgraduate students in Environmental and Natural Sciences.

Another category of actors who influence the studies of environmental and natural sciences are the government ministers who head the ministries which are involved with developing key government policies and monitoring those policies since they wield political power.

The Minister for Education plays a critical role in curriculum development in this field of study and also formulates key government policies on education at all levels. The Minister for Finance is the individual who advises government on how available funds should be used or invested in the field of natural and environmental science studies. The Ministers for Land, Water and Natural resources are interested in the graduates and other skilled personnel trained from the institutions.

The Minister of Science and Technology also advises government on the development of science and innovation in the country. The Parliamentary Select Committee on Science and Environment are also major political actors in environment and natural resource policies.

### **3.4.2 Institutions of ENRS in Ghana**

Generally, the primary aim of establishing any institution in the field of environment and natural resource management is to help regulate access to the resources. However, to help in improving the management of natural resource and the environment and also to improve training and research in the field, institutions have been set up by Acts of Parliament to help legalise operations of these institutions. These institutions also have sets of rules and regulations governing their establishment and operations. These institutions are also mandated to help governments develop sound policies relating to environmental and natural resources. In summary, these Institutions - regulate access to natural resources.

The universities and research institutions remain the key institutions established by laws for environmental and natural resources studies in Ghana. For instance, the University of Ghana was founded as the University College of the Gold Coast by Ordinance on August 11, 1948 for the purpose of providing and promoting university education, learning and research. The University of Ghana was established by University of Ghana Act, 1961 (ACT 79). The Kwame Nkrumah University of Science and Technology was also established by an Act of Parliament (ACT 80) 1961 with the aims to provide higher education, to undertake research, to disseminate knowledge and to foster relationships with outside persons and bodies (Daniels, 1996; Benneh, 2002; and Effah, 2003).

Thus, since the inception of Higher Education in Ghana, the study of courses in relation to environment and natural resources sciences and management have been part of most public



universities programmes. From just one University College in 1948, Ghana currently has eight (8) public universities and over seventeen (17) private universities.

The full list of public universities accredited by the National Accreditation Board (NAB) as at January 2013 include the following: University of Ghana, Kwame Nkrumah University of Science and Technology, University of Cape Coast, University for Development Studies, University of Education, the University of Health and Allied Sciences, University of Mines and Technology, and University for Natural Resources and Renewable Energy. Except for the University of Health and Allied Sciences, which does not have programmes in natural and environmental sciences disciplines, the other seven universities have programmes in this field at all levels (including the postgraduate).

The University of Ghana was founded as the University College of the Gold Coast by Ordinance on August 11, 1948 for the purpose of providing and promoting university education, learning and research. The University of Ghana was established by University of Ghana Act, 1961 (ACT 79). The Kwame Nkrumah University of Science and Technology, Kumasi was established by an Act of Parliament Act, (ACT 80) 1961 with the aims to provide higher education, to undertake research, to disseminate knowledge and to foster relationships with outside persons and bodies (Daniels, 1996; Benneh, 2002; and Effah, 2003).

Effah (2003) adds that private universities have sprung up in Ghana since the early 1990's with the number reaching more than seventeen in 2014 from the initial single private university in 1990. Documents from the NAB indicates that some of the accredited private university (colleges) includes: Central University College, Methodist University College, All Nations University College, Catholic University College of Ghana, Islamic University College, Presbyterian University College, Wisconsin International University College, Valley View University the Presbyterian University College and Valley View University College which read undergraduate programme in the field of Natural and environmental sciences, the rest of the private universities do not.

Ghana has polytechnics as part of the country's tertiary education sector. In all, the country has ten (10) polytechnics; one in each of the country's regional capitals. The focus of polytechnic education in Ghana since its inception has been on vocational and technical training of its graduates. Apart from Bolgatanga Polytechnic which runs a Higher National Diploma in the area of Ecological Studies, the rest still do not run any programme in the ENRS.

Another institution established by law which plays a critical role in natural and environmental sciences studies is the CSIR. The Council for Scientific and Industrial Research (CSIR) was established by the National Liberation Council (NLC) Decree 293 of 1968, and amended by NLCD 329 of 1969, and re-established in its present form by CSIR Act 521 on, 1996. The CSIR is mandated to perform several functions including: pursuing the implementation of government policies on scientific research and development; advising the sector Minister on scientific and technological advances likely to be of importance to national development; and encouraging coordinated employment of scientific research for the management, utilization and conservation of the natural resources of Ghana in the interest of development (<http://www.csir.org.gh/index.php/about-csir>).

The Ghana Academy of Arts and Science is also another institution interested in the advancement of science and technology; and the use of scientific outcomes for national development (<http://gaas-gh.org/>). The Academy's objectives, partly reviewed over the years are to:

1. promote the study, extension, and dissemination of knowledge of the arts and sciences;
2. establish and maintain proper standards of endeavour in all fields of the arts and sciences;
3. recognise outstanding contributions to the advancement of the arts and sciences in Ghana; and
4. Contribute actively to the development of Ghana and Africa generally by examining and addressing crucial issues of development.

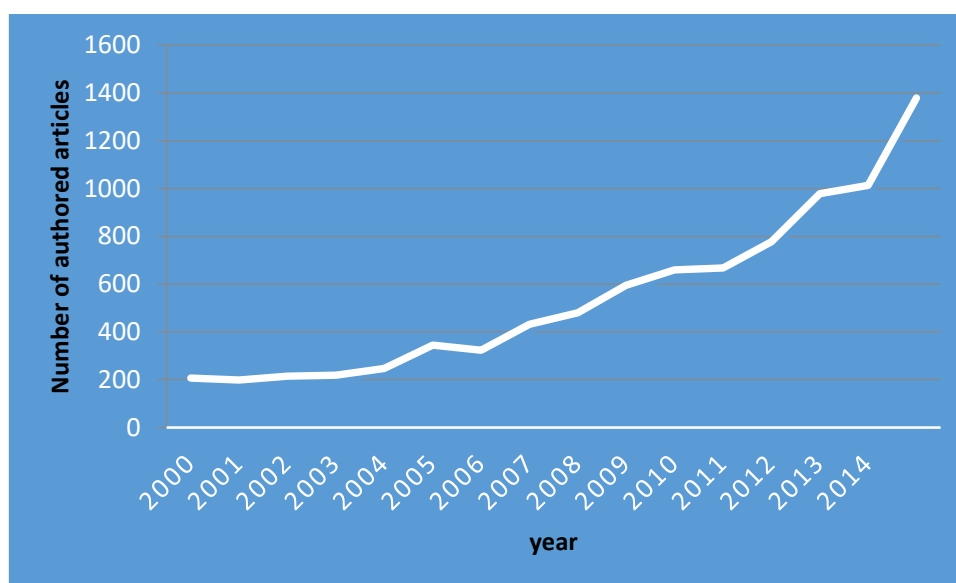
### **3.5 A Bibliometric Analysis of ENRS Research in Ghana: 2000 –2015**

This section presents a bibliometric analysis of research in environment and natural resource sciences in Ghana. The analysis describes the current trends, using the literature in the Web of Science (WoS) database from 2000 to 2015. The WoS, relative to several other bibliographic databases, has the advantage. The WoS includes a wide coverage of recognised, citation-based and widely read scientific journals.

The WoS SCI database has been used to carry out research evaluation in relation to the field of ENRS. Using the SCI database, Guoa *et al* 2014 published an article on “Global research on soil contamination from 1999 to 2012: A bibliometric analysis”. Jie Hu in 2010 conducted a research on “A historical review and bibliometric analysis of research on lead in drinking water field from 1991 to 2007” and was published in the *Journal of Science of the Total Environment*.

The results from the analysis indicated that there has been an increasing number of annual publications mainly during two periods: from 1992 to 1997 and from 2004 to 2007. United States produced 37% of all pertinent articles followed by India with 8.0% and Canada with 4.8%. *Science of the Total Environment* published the most articles followed by *Journal American Water Works*.

An advance search in the WoS on Ghana (cu=ghana)<sup>3</sup> shows that Ghana-authored articles have been increasing since the year 2000 as shown in figure 3.1 below.



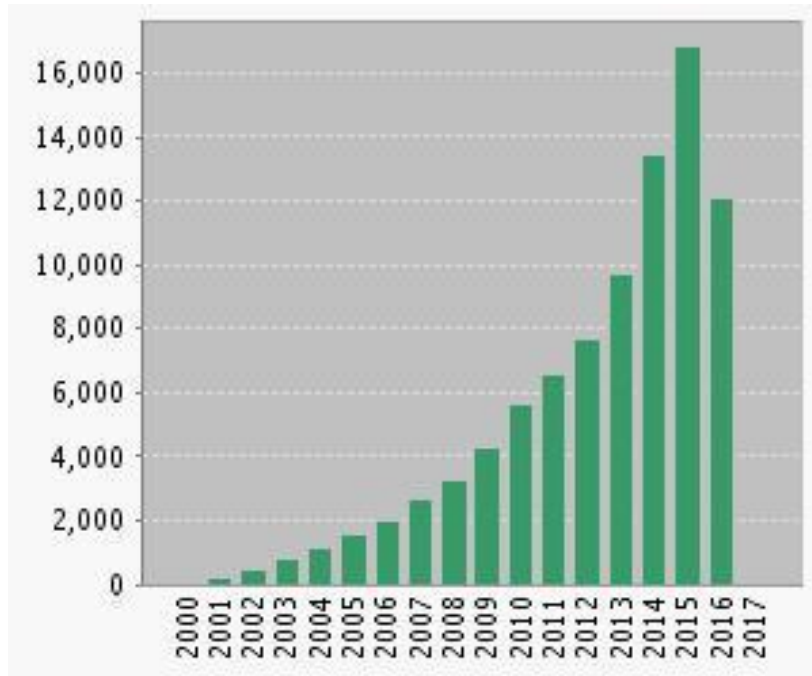
**Figure 3.1 Ghana-authored articles in WoS (2000 to 2015)**

The total number of articles increased from just over 200 annually in the year 2000 to more than a 1000 articles annually in 2014. As at end of 2015, the total number of Ghana-authored articles in the WoS since the year 2000 was 7,253. The above figure shows that the number of authored articles by Ghanaian scholars in the WoS has increased by over 3,600 % between 2000 and 2015.

Ghana's number of articles in the WoS sum to 7,253 published over the last 15 years as shown in Figure 3.1. The increase is steady and has shown no decline during the period. The average number of published article per year has increased each year with the highest increase occurring in 2014 and 2015.

<sup>3</sup> Country(cu) is Ghana

The number of citations to these publications has also increased per year since 2000 (see Figure 3.2).



**Figure 3.2 Citations per year**

Overall, Ghana's publications of 7253 in the WoS during 2000 -2015 have been cited 88,473 times with 79,227 times cited without self-citations. Articles which have received citation are 64,314, with 60,884 citing articles without self-citations. The average number of citations per item was 12.20.

Of the 7253 Ghana-authored articles in the WoS, the University of Ghana has contributed two thirds of the total publications. Between 2000 and 2015, the University of Ghana has contributed over 39.3 percent of total publication in the WoS (see Table 3.1 below).

**Table 3.1 Publications per organization in WoS**

<b>Organizations</b>	<b>Number of publications</b>	<b>Percentage (%)</b>
University of Ghana	2581	39.3
Kwame Nkrumah University Science Technology	1579	24.0
Noguchi Memorial Institute for Medical Research	554	8.4
University of Cape Coast	453	6.9
Ghana Health Service	356	5.4
University for Development Studies	238	3.6
Ghana Atom Energy Commission	225	3.4
Council for Scientific and Industrial Research (CSIR)	211	3.2
Navrongo Health Research Centre	208	3.2
Ministry of Health	169	2.6
<b>Total<sup>4</sup></b>	<b>6574</b>	<b>100</b>

The KNUST is second, contributing 24 percent of the total publications. Both the University of London and London School of Hygiene Tropical Medicine collaborate extensively with universities and research institutions in Ghana on several research projects and therefore co-authors from these institutions and some institution in Ghana.

The University of Ghana and KNUST have over the years established a very strong collaboration with research institutions based in Europe and in the USA such as the Kumasi Center for Collaborative Research in Tropical Medicine and London and London School of

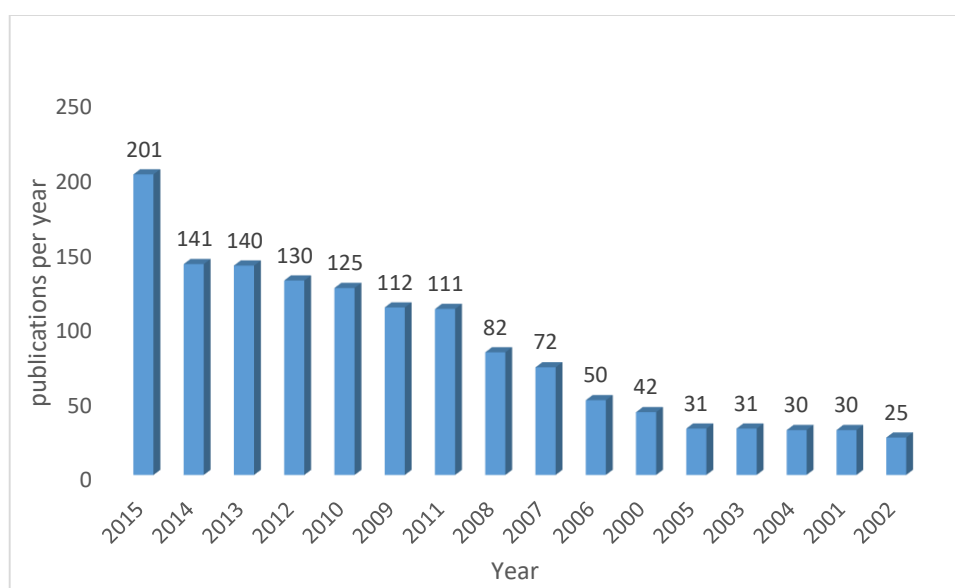
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<sup>4</sup> The total is without the overseas institutions. It reduces the total count from 7253 to 6574

Hygiene Tropical Medicine. These institutions have built their research centres in the respective universities in Ghana and carry out most of their research in Ghana. They have also involved postgraduate students from Ghana and other African countries in their research work. They also publish with these students and researchers.

A subsequent search was conducted focusing on the field of ENRS<sup>5</sup>, The results show that Ghana-authored publications between 2000 and 2015 sum to 1,653 (out of the total of 7, 253). Figure 3.3 shows that the number of publications related to ENRS has been increasing steadily since 2002. The field of ENRS still contributes less than 250 publications per year in the WoS which is less than 3 times the numbers field of Public health produces each year.

The lower numbers of publications from the field of ENRS compared to that of public health and medical science in the WoS can be attributed to that fact that the latter field is older and of more importance to donors and government of Ghana. In addition, the public health research centres have been involved in external funded research for a long time. The field of ENRS research is new and gained importance after 2000.



**Figure 3.3 Publication per year in ENRS categories**

Overall, the environmental sciences category contributes the most to the field of ENRS, contributing 39 percent of the total publications in the field from 2002 to 2015 as shown Table

<sup>5</sup> The WoS does not have “Natural Resource” as a subject field. The search was done using the various categories in WoS that defines the field of ENRS including environmental science, zoology, environmental sciences, meteorology amongst others.

3.2. The above is because the ENRS is an integrated field and includes research from other areas of the major fields of natural science.

**Table 3.2 WoS categories in the field of ENRS**

<b>Web of Science Categories</b>	<b>Number of publications</b>	<b>% of 1653</b>
Environmental Sciences	524	31.7
Water Resources	260	15.7
Environmental Studies	159	9.6
Ecology	142	8.6
Agronomy	124	7.5
Forestry	99	6.0
Soil Science	98	5.9
Horticulture	84	5.1
Geosciences Multidisciplinary	84	5.1
Engineering Environmental	79	4.8
<b>TOTAL</b>	<b>1653</b>	<b>100</b>

Publications in water resources, environmental studies and ecology have also contributed more than 57 percent of the publications in the categories in the field of ENRS in the WoS (as shown in Table 3.2 above). Forestry which is a well-studied field in Ghanaian universities contributes less than 10 percent of publications in the field of ENRS in the WoS. The low contribution from forestry publications in the WoS can be attributed to researchers' interest in publishing in more open access journals and also publishing more technical notes and policy briefs.

The University of Ghana still contributes the highest number of publications from Ghana in the WoS, contributing more than 26 percent of the total publications between 2000 and 2015 (see Table 3.3 below). KNUST is the second highest, contributing more than 25 percent of the entire publication in the field of ENRS.

**Table 3.3 Publications per organization (2000 -2015)**

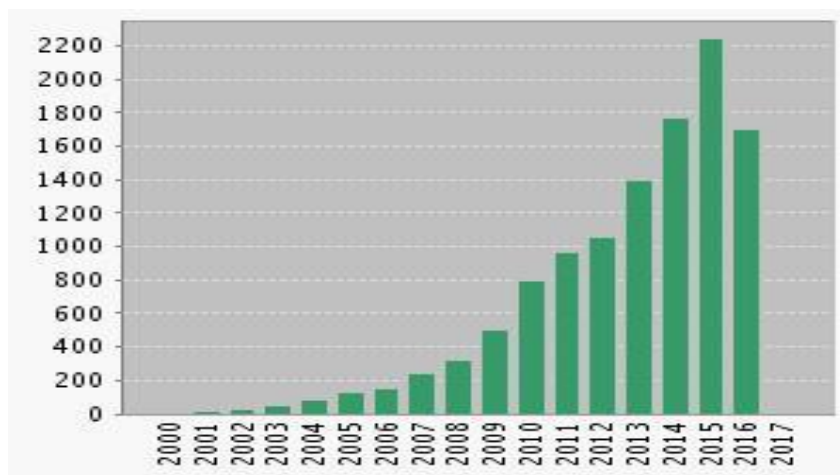
<b>Organizations-Enhanced</b>	<b>Number of publications</b>	<b>% of 1653</b>
University of Ghana	361.0	21.8
Kwame Nkrumah University of Science and Technology	347.0	21.0
University of Cape Coast	91.0	5.5
International Water Management Institute (IWMI)	83.0	5.0
Council for Scientific and Industrial Research (CSIR)	72.0	4.4
Ghana Atom Energy Commission	62.0	3.8
University for Development Studies	51.0	3.1
Others	586.0	35.5
	1653	100.0

Overall, in the field of ENRS, the two main public universities in Ghana have contributed more than 40 percent of publications in the field in the WoS. The two universities have postgraduate programmes in the field and also collaborate more with selected institutions abroad. They are the oldest universities and also public; that also helps them to ensure some credibility from donors and foreign institutions which undertake research in Ghana. They also have standard research facilities which most of the other institutions do not have.

CSIR which is the main research organization has contributed less than 6 percent in the last 15 years. This is not encouraging and can be attributed to their scientists publishing in other journals not in the WoS database. In addition, there is not much supervision on where scientists of the CSIR Ghana can and should publish. In addition, not until recently CSIR was not well resourced (both staff and funds). They mostly undertake research with support from local institutions and the private sector in Ghana.

The citation counts on articles in the field of ENRS within the WoS have increased steadily since 2000 to 2015 (as shown in Figure 3.4 above).





**Figure 3.4 Citation counts in ENRS categories**

The 1653 publications in the ENRS categories have received a total of 11,447 citations with 10,495 citations without self-citations in the 15-year period. Citing articles of 9445 with 8976 citing articles without self-citations. Average citations per publication is 8.48 which is below the average of 12.20 for all Ghana-authored publications.

Ghana's contribution to publications in the WoS has increased significantly in the last 15 years across all fields. The field of health and allied sciences continues to be the biggest contributor of publications in the WoS from Ghana. In addition, the University of Ghana continues to be the lead Ghanaian institution contributing more than two-thirds of Ghana's share of publication in the WoS. The number of publications and their respective citation counts have been improving and show no sign of decline.

The field of ENRS contributes 18.7% to the total number of publications. However, only two subfields (environmental sciences and water resources) contribute more than 50 percent of publications in the broad field of ENRS.

Compared to other countries such as South Africa and Egypt (not to mention the USA, China and the UK), Ghana's share in global research output in the WoS is still very low and more has to be done. Research institutions and universities should publish some of their findings with journals in the WoS.

## CHAPTER 4

### RESEARCH DESIGN AND METHODOLOGY

#### 4.1 Introduction

This chapter provides an overview of the research design and methodology used in this study. The study integrates different methods including content analysis of completed theses, a CV-analysis of the authors, bibliometric studies of any publications that ensued from the doctoral theses and finally in-depth interviews with key informants (university academics, students, policy makers in this field, etc.).

This chapter is organised as follows: Section 4.2 gives the research settings of the study. Section 4.3 discusses the selected methods used to undertake the field study. This includes the CV analysis of the selected PhD authors; bibliometric analysis of the publications of the authors and interviews conducted. The design of the interview guide and how it was used for the study is also elaborated. Section 4.4 discusses the analysis of data from interview guides using the computer assisted software Atlas.ti. 7.0 version.

#### 4.2 The research setting

This study explores the outcomes and possible uptake of doctoral research work and its relevance to selected policies in the field of natural and environmental sciences in Ghana.

The study approach was predominantly a qualitative one. The research sought to produce findings to better understand if there was uptake of PhD thesis findings and how it was done. The research questions could not be answered statistically. In answering the research questions and also meeting the objectives the study, the qualitative approach provided an in-depth and interpreted understanding of the social background of the interviewees by learning about their social and specific situations, their experiences, viewpoints and histories of undertaking a doctoral study.

The rationale for this study emerged after I completed my Master's degree in 2007 by compiling the abstracts and other relevant information on Postgraduate research work (Masters and PhD) in natural and environmental science since 1980 from the two main universities in Ghana (KNUST and UG). After compiling that data, I reviewed relevant policies

in the selected field and identified that there were some environmental problems which the country face have already been research at the doctoral level.

The study was conducted within the departments which undertake courses and research in the natural and environmental sciences within the university of Ghana and Kwame Nkrumah University of Science of Technology during the period of the study. The department's research fields and doctoral studies cover the broad areas of Forestry, Applied Physics and Chemistry, Wetlands Management, Biological Sciences, Natural Resources Economics and Management amongst others. Some of the disciplines are similar to those found in the social sciences and humanities. However, this study was limited to the doctoral theses in the field of Science & Engineering and Natural Resources Management covering the years 2000-2013.

In the next sections the approach used to collect the data used for the study is presented. In addition, the methods used to analysis the information generated from the interviews and how the interviews were conducted are presented.

### **4.3 Data Collection**

#### **4.3.1 Selection and Content Analysis of PhD Thesis**

The study compiled information on the title; author and abstracts of Masters and PhD research conducted in the field of environment and natural resources in Ghana. During the study, the libraries of the UG and KNUST were visited between February and March 2007. The study then compiled the reference and Abstracts of masters and PhD theses conducted in these universities since 1980 to 2006.

The study involved the downloading of the relevant theses from online sources, and visits to libraries of selected faculty and departmental libraries in the University of Ghana and the Kwame Nkrumah University of Science and Technology to collect information on PhD theses produced from departments which run courses related to Environment and Natural Resource Science.

That data of the earlier research conducted in 2007 was first submitted to my supervisor and upon several discussions, a decision was made to work on only PhD thesis in the field of Environment and Natural Resource Sciences produced in Ghana between 2000 and 2013. The assumptions to work on data during the specified period and field included:

1. Doctoral research enrolled by Ghanaians increased both in Ghanaian universities and abroad since 2000 when the missions of most Ghanaian universities shifted (as discussed in the Chapter 1 of this thesis)
2. The field of Environment and Natural Resource Sciences and its related fields of research in Ghanaian universities have had the highest number of PhD enrolments and graduates since 2000.
3. Most Ghanaian Universities have departments related to the field of ENRS.
4. Majority of Ghanaians have received PhD scholarships in this field to study in overseas universities since 2000. One of such projects is the GLOWA Volta projects funded by DAAD. The project trained more than 20 PhD graduates during a ten-year period between 2004 and 2013.

The theses (authors) finally selected were Ghanaians citizens irrespective of where they undertook their PhD studies. In addition, their theses also had Ghana as the object of their study. Finally, they should have been working in Ghana at the time of the study to have access to them for the interviews.

An official letter was sent to the General Secretary of the University of Ghana Graduate School in April 2014 requesting him to make soft copies of PhD theses from selected faculties (Science, Social Sciences and Agriculture) for the period under study. Upon several follow ups, the request yielded no results.

Efforts were also made to get information on theses from the University Library but they also did not have the recent soft copies of most of the selected faculties. The Data section of the Registrar of the UG also did not yield any results. I made an attempt to visit the Heads of Departments of selected faculties for some relevant information leading on how I could get the softcopies of PhD thesis. All the above efforts were fruitless.

After numerous discussions with relevant people, soft copies of thesis were downloaded from the online repository of the UG. I then had to rely on networks going forward. I sent official emails to authors whose theses I found online and some lecturers of the university and CSIR whom I know supervised PhD graduates in this field from the UG and other universities from abroad.

Generally, my observation from the University of Ghana was that in the past years, theses of students have been regarded as a property of the students. The university only requested

abstracts during the submission of the thesis and three hard copies (which were even more difficult to find at the library and departments).

At KNUST I relied on assistance from a Deputy Registrar of the University. He led me to the library and offered to compile all soft copies of PhD theses from the university for me. This was done over a period of two months. A total of over 25 PhD theses were sent to me. After critically sorting the theses sent from KNUST using keywords in the field of ENRS, only 18 of the theses were found to be relevant to the study and were therefore used.

An online search was conducted to identify PhD theses that focused on Ghana from any university (home or abroad). Searches were conducted using keywords “**Ghana and PhD Thesis**” **AND Natural Resources and Environment**”. After going through the search engine for a week, a total number of over 20 PhD theses were found relevant to the study (these are theses conducted by Ghanaians on Ghana in a foreign university mostly South Africa; the United Kingdom and UNESCO-IHE, The Netherlands).

Finally, the University of Bonn, Centre for Development Studies website (<http://www.zef.de/index.php?id=2212>) was visited and the theses of PhD graduate trained on the GLOWA Volta Project were downloaded. These included the theses of the following respondents: Emmanuel Obuobie, Wilson Agyare and Benjamin Kofi Nyarko.

After gathering all the theses from the various sources discussed above, the following is the summary in table 4.1.

**Table 4.1 Theses retrieved from various institutions**

<b>Theses sources</b>	<b>Number</b>	<b>Percentage</b>
University of Ghana	11	16.67
KNUST	25	37.89
ZEF	13	19.70
UNESCO	5	7.60
Other Universities Abroad	12	18.18
<b>Total Thesis Received</b>	<b>66</b>	<b>100</b>

As shown in Table 4.1, KNUST produced the highest number of theses, almost 38 percent. Although most of the theses were on the university’s website, they are not properly organized.

The soft copies of all PhD graduates from ZEF since 2004 were available on the website, making them the second biggest source to gather soft copies of theses.

#### **4.3.2 CV analysis of PhD Authors and Coding**

After gathering the theses documents, a CV analysis (which now is an established methodology) was used for the study to analyse the respondents' experiences and utilisation of knowledge of national policy in their fields before and after doctoral studies.

Before the year 2001, research evaluation has traditionally focused on tangible and easily computable research output such as scientific publications and patents. However, since 2001 the CV as a method on science policy and research evaluation has been used by most researchers.

Bozeman and RVM colleagues (2001) (and Bozeman, 2008) proposed a change in the paradigm for evaluating the research activities performed by individuals and organisations. This change consists of moving from the 'output paradigm' to the 'capacity paradigm'. The new approach shifts the evaluation focus to 'scientific and technological human capital', which regroups the abilities of persons, institutions and social aggregates to contribute to scientific and technological knowledge. From this new perspective, the success or failure of policy actions (such as project- funding and programs) should be evaluated in terms of their ability to enhance individual and organizational capacities to produce knowledge or to apply it in technology. In this view, it is the long-run productive capacity that is crucial, not particular knowledge products at particular times (Canibano and Bozeman (2009).

The utility of CV data for study of knowledge value is striking, because of its tremendous richness—richness that must be tapped if one is to move away from traditional labour and productivity models in favour of knowledge value models. The CV provides not only a clear-cut indicator of movement from one work setting to the next but is, in a sense, a representation of certain aspects of knowledge value. The CV, unlike other data sources, often recounts the entire career of the scholar in some detail. Thus, it is not simply a list of credentials, but a historical document that evolves over time capturing changes in interests, jobs and collaborations. Whether viewed as a historical record, a marketing tool, or a scientific resource, it is a potentially valuable datum for persons interested in career trajectories, research evaluation, or, more generally, science and technology studies. Not only is the CV nearly universal, it is in some respects standard, and it is relatively easily obtained (sometimes even from the public domain). Most importantly, the CV contains useful, concrete information on the timing, sequence, and duration of jobs, work products (e.g., articles, patents, and papers),

collaborative patterns, and scholarly lineage. The CV is, indeed, a rich source of longitudinal data, which lends itself especially well to the study of phenomena associated with careers and labour flows—precisely the target of knowledge value.

In addition to its value as a stand-alone source of data, a great advantage of the CV is that it can be used in conjunction with other sources of data. The availability of a wide array of citation data through the Science Citation Index is extremely valuable.

Very critical to this study is the relevance of PhD thesis outcomes to policy. This can be investigated using the CV. Researchers have also called attention to the role of early career collaboration and mentoring as spurs to longer-term scientific productivity. Long and McGinnis (1985) found that predoctoral collaboration with mentors had significant and lasting effects on the careers of biochemists. The productivity of the mentor was positively and strongly related to the biochemists' own publication productivity six years later. For students who had not collaborated with their mentor, there was no relationship. Similarly, Reskin (1977) studying chemists who obtained their PhD in the late 1950s, found graduates from higher "caliber" departments were more likely to have collaborated with their doctoral mentor and showed higher productivity after their first postdoctoral decade than graduates from lesser-prestige departments. Zuckerman (1977) revealed that Nobel Prize winners viewed their doctoral apprenticeship as crucial to their later success.

Specifically, they pointed to its role in building broad skills such as knowledge of proper standards of achievement, tastes in choice of research problems, and confidence in their work and abilities.

In the March 2008 edition of *Research Evaluation*, Canibano, Otamendi and Andujar as well as Dietz *et al.* 2000: 17 mention that "the only existing type of document which summarises all the professional activities performed by researchers is their curriculum vitae (CV)." Although influenced by national institutional frameworks, the reliance of researchers on their CVs for different purposes (job searching, fundraising, grant applications, etc.) is a universal feature. In parallel with careers, CVs evolve over time capturing changes in interests, jobs and collaborations (Dietz *et al.*, 2000). CVs reflect both, career trajectories and also the outcome and specific features of these careers. Researchers' curricula have recently been employed for researchers' careers' analysis and research evaluation purposes. The results attained in the United States within the Research Value Mapping (RVM) project are quite promising (Bozeman *et al.*, 1998). This project extensively exploited CVs to study career paths of scientists and engineers (Dietz *et al.*, 2000) and impacts on productivity and careers of

research grants (Gaughan and Bozeman, 2002; Corley *et al*, 2003), collaboration with industry (Bozeman and Corley, 2004; Lee and Bozeman 2005) and inter-sectoral job mobility (Dietz and Bozeman, 2005; Lin and Bozeman; 2006). In Europe, Mangematin (2000) and Sabatier *et al* (2006) have employed CVs to assess PhDs trajectories and professional promotion of scientists.

The CV provides a rich source of longitudinal information addressing nearly all dimensions of a researcher's career (Bozeman *et al*, 2001) including their connections to other researchers and to different types of research collectives. Despite its apparent potential, the CV had been only very rarely used as a research evaluation tool before the applications under the RVM program (see Dietz *et al*, 2000).

After the emails of the selected authors were identified from the institution's website and other available documents online (such as workshops reports amongst others), official letters of cooperation were sent from CREST directly to the respondents who were asked to submit a full CV via emails. A total number of 55 letters were sent out. In contrast, for internet search, various search engines and search phrases were tested to identify web posted CVs of respondents. No CVs were solicited from respondent's institution or affiliation. In addition, a number of CVs were obtained "passively" from a search of the Internet through workshop and conference reports; institutions' research and also search with keywords **\*(name of author) \*CV\***.

The CVs were to help trace the demographics; job trajectories after PhD and if they have been in the policy to influence the uptake of their findings and recommendations of their PhD research. In addition, the list of publications during and after their PhD studies; the number of consultancies; conferences attended and their presentations at these workshops were in line with their field of studies.

Follow ups were done on all respondents who did not reply after a month. Gentle reminders were sent to them requesting them to respond to the emails and the contents of the letters sent to them. Some respondents agreed to the interviews but will only give me their CVs in person.

The responses to the emails and online search for the CVs are presented in table 4.2 below:



**Table 4.2 Number of responses from respondents**

<b>Number / Activities</b>	<b>Number</b>	<b>Percentage</b>
Responded with CVs	17	38.63
Agreed to give CVs during the Interview	5	11.36
CVs extracted from websites	10	22.72
No response	12	27.27
Total	44	100

A total number of 18 CVs were obtained in response to an email message sent to researchers working in the field of Environment and Natural Resources.

The second phase of the study consisted of identifying as many of the authors of the theses with a view to contacting them and then requesting them to send their CVs.

Some challenges encountered with the CV analysis were amongst others the non-availability of CVs; Heterogeneity; Truncation; and Missing Information. Each of these challenges is explained briefly in turn. On Non-availability of CVs, more than 30 percent of respondents who received our emails did not respond to the mail nor sent their CVs. The Institutional Websites of the respondents who did not respond did not have their CVs on their page.

On Heterogeneity, all the CVs received were presented in different formats. They varied in length and in ordering length. Two (2) respondents submitted abridged CVs instead of the full and current CV request from them in the email. One (1) CV did not have a list of publication and most of the CVs did not have important demographical data including full name (without abbreviation); sex and date of birth. Some CVs had consultancies; conferences and workshops attended and community engagements of the respondents before, during and after PhD studies whilst others did not have one or all of the above stated.

Moving on further to Truncation, some of the information received from the respondents did not tally with their information on the website of their affiliated institutions. Some of the CVs were not up to date i.e. not current as requested from the respondents. This is common amongst scientists as they rarely take time to update their CVs most often. On their bibliometric data source, some respondents' list of publications were not complete as they in some cases did not have the name of journal or book publisher in the citation.

Some of the CVs had missing data as stated in the discussion on Non-availability above. In agreeing with Dietz *et al* (2000) most of the CVs did not have the following:

1. Career trajectory, such as the beginning and end of job durations and the year in which the degree was completed;
2. Grants: missing duration of the award, unclear identification of the respondent as principal or co-principal investigator;
3. Quality of publications; and
4. Patent data.

However, the validity of the CVs were checked during the interviews. In addition, aspects of the CV were also checked online such as the biodata; the publications and also professional experience of the interviewee.

#### 4.3.3 Background of the Respondents

In all twenty (20) respondents were interviewed for the study. All respondents were PhD holders in the field of Environmental and Natural Resource Sciences who are currently working in Ghana. They obtained their PhDs between 2006 and 2014 with the majority of them graduating with their PhD between 2008 -2012.

Out of the twenty respondents, sixteen (16) are male and four (4) females. They are in the age range of 35 years to 58 years. The female respondents were in the age range of 35 and 45 years while the males were 36 years to 58 years as shown in the table 4.3 below. The age when one receives a PhD has direct impact on the uptake and utilization of his research findings. Mostly respondents who obtained their PhD after 48 years did that to a large extent because of job requirements. They spend most part of their post PhD career seeking more consultancies to prepare for promotion or retirement.

**Table 4.3 The gender, age range of respondents and countries where PhD was obtained**

Gender		Age Range		Country of PhD studies	
Male	Female	Male	Female	Ghana	Outside Ghana
16	4	35 -45	36-58	8	12

With their Post-doctoral careers, nine (9) respondents work with universities as lecturers and researchers; two (2) work with a government regulatory body that focuses on environmental and natural sciences; three (3) respondents are working with NGOs and also private consultants; whilst six (6) work as Research Scientist with the Water Research Institute and Forestry Research Institute of the Council of Scientific and Industrial Research in Ghana (CSIR).

The Institutions and area of operations of the respondents are located in five (5) out of the ten (10) political regions of Ghana. From the Greater Accra region respondents were from the University of Ghana, the CSIR- Water Research Institute and The Central University (a private university) and The Community Water and Sanitation Agency. From the Ashanti Region, the Kwame Nkrumah University of Science and Technology (KNUST) and the Forestry Research Institute of the CSIR. From the Brong Ahafo region, The University for Energy and Natural Resources Management (which is a new public university less than 5 years since its establishment). From the Central Region of Ghana, the University of Cape Coast and from The Western region, The Wildlife Division of the Forestry Commission of Ghana. From the Northern Region of Ghana, the University for Development Studies at Tamale.

Eight (8) of the respondents received their PhD degree from Ghanaian universities whilst the remaining twelve (12) obtained theirs from outside Ghana; specifically, Germany six (6), The Netherlands four (4), The United Kingdom and South Africa one (1). There were four (4) out of the six (6) who obtained their PhD in Germany from the same university i.e. the Centre for Development Studies (ZEF), University of Bonn and three (3) out of the four that went to Netherlands obtained their PhDs from the same university- UNESCO-IHE<sup>6</sup>. The study analysed and compared the uptake and utilisation of thesis recommendation of respondents from ZEF and UNSECO-IHE.

#### **4.3.4 Bibliometrics of PhD Authors**

The third phase of the study consisted of a detailed bibliometric analysis of any publication (both in the scientific and popular literature) listed in the CVs of the individuals concerned.

During the last decades bibliometric methods have become quite fashionable for the evaluation of scientific research and for the assessment of individual researchers. The most frequently used bibliometric measures are the following:

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<sup>6</sup> UNESCO-IHE Institute for Water Education is the largest international graduate water education facility in the world and is based in Delft, Netherlands

1. The number of papers published by a given researcher or research group, as an indication of his/its productivity.
2. The frequency with which a published paper is cited in later publications by other researchers, as an indication of the interest the paper has raised.
3. The frequency with which an electronically available paper is downloaded by readers, as an indication of its importance.
4. The average frequency with which the papers in a given journal are cited during a given time span after publication, as an indication of the scientific quality of the journal or of the thoroughness of its peer review.

Since the number of citations is a driving force for evaluating researchers in their career promotion, researchers tend to cling to “trendy research” in fields where many other researchers are active and where scientific funds can more easily be obtained. The result may be a trivialization of research subjects instead of an active search for original research ideas.

The list of publications of all respondents were copied from their CVs or affiliated institution websites. The title of thesis and name of the author was entered separately into Google Scholar for citation counts of the thesis. In all, the citation counts of all the theses ranged from zero to a maximum of 25 counts.

Google Scholar offers a good and free alternative. By searching, e.g., with the author name, you not only obtain a list of publications, but for each of them the number of citations and even the link to all citing papers. Google Scholar may be a better alternative for the Social Sciences. The main objective was to trace the trends in scientific outputs of their research during and after their PhD studies.

Another bibliometric study that was conducted on the publications of the authors was the type of journals they published in and if any of those journals were predatory. According to Beall (2012), Predatory, open-access publishers are those that unprofessionally exploit the author-pays model of open-access publishing (Gold OA) for their own profit. Typically, these publishers spam professional email lists, broadly soliciting article submissions for the clear purpose of gaining additional income. Operating essentially as vanity presses, these publishers typically have a low article acceptance threshold, with a false-front or non-existent peer review process. Publishing in Predatory Journals have a long term effect on the researchers when they are due for promotion.

All journals that the respondents have published with were entered into an Access database and then each journal name was compared to Beall's 2015 list of Predatory Journal Publishers.

#### 4.3.5 Interview Guides

The final phase of the study consisted of in-depth and semi-structured interviews with twenty (20) individuals whom we could contact and had agreed to participate in the study. The respondents were put into four (4) categories as shown in the table 4.4 below:

**Table 4.4 Category of Interviewees**

<b>Number/Categories</b>	<b>Career after PhD</b>	<b>Total Number Interviewed</b>
1	Researchers	9
2	Academics	6
3	Government Agency/ Policy Regulatory Body	2
4	Consultants/Non-governmental Organization	3
	<b>TOTAL</b>	<b>20</b>

An interview guide was developed for each respondent. The interview guide was based on the experiences of the authors' of doctoral theses and for some clarifications from their CVs in relation to the study. In addition, the interview guides also had some general questions on challenges for PhD research in the field of ENRS in Ghana. Another set of general questions related to how the interviewees defined themselves now and the way they see their career develop in the next 5 to 10 years. An example of the interview guide can be seen in the Appendix.

The questions enquired what the doctorate author had used his or her knowledge for and if he or she disseminated the findings of the research; participated in the development of any local/or national policy (ies) after his or her study. Furthermore, the authors' background information was discussed, including the motivation for the selection of their theses topics and their overall PhD studies.

All questions were asked in English. The collected data is reported in such a way that persons could not be identified. The data was collected through interviews that lasted for about an hour during March to May 2016 in the interviewees' places of work and were recorded, with the

agreement of the interviewees, transcribed for analysis in MS word and anonymity of the participants was ensured. The transcribed interviews were then sent to the interviewees for validation.

#### **4.4 Data Analysis**

The sections below report on how the transcribed interviews were coded in Atlas.ti.

##### **4.4.1 Coding of CVs**

CVs received were coded in Microsoft Access. Some information from the CVs included the respondent's full name; age; gender; educational institutions' attended and years completed; the academic programmes undertaken; Professional experience at the time of completing PhD; career trajectory since PhD graduation (Academic career/ consultant/ government employee/ private sector/ other/ hybrid); Professional Networks; Publications after PhD; Publication on the findings of the PhD; Other Consultancies/ Other Professional Engagement; Community Engagement; Conferences Attended; and Workshops or Research activities after PhD. The study analysed the content of the CV extracted and identified if there were linkages between PhD work and policy uptake and the efforts authors have had to make to ensure uptake of their findings.

##### **4.4.2 Coding with Atlas.ti**

If qualitative research is to bring about meaningful and useful results, it is imperative that the material under scrutiny is analysed in a methodical manner (Attride-Stirling 2001; Pope, Zeibland and Mays, 2014). Content and thematic analyses were the main techniques for data analysis of the interviews. Thematic analysis is a method for identifying, analysing, and reporting patterns (themes) within data. It serves to organise and describe a data set in detail and further, to interpret various aspects of the research topics (Braun & Clarke, 2006). To support the analysis, the software Atlas.ti was used. Atlas.ti is a standard qualitative data-analysis software. The version 7 was used for the coding.

The coding scheme was drawn out with the main issue to investigate in this study. The main issues to be investigated in this study included why the interviewee undertook a PhD study and whether the findings of the PhD have had some uptake since graduation? How have they optimised the uptake of their thesis recommendation? Have obtaining PhD helped them get consultancies? What is the linkage between their publications, current profession and professional networks? Where did they publish after graduation and what was their knowledge of predatory outlets? General issues on the challenges of PhD research in the field of ENRS

and ways of improving uptake were also investigated. The interviewee was also asked to define himself/herself and where he/she sees himself or herself in the next 5 to 10 years.

The MS word documents were converted to “Rich Text Format” before upload into Atlas.ti in order to support Atlas.ti version 7. The files were named to reflect the person’s initials; where PhD was obtained; Gender and type of profession i.e. (**Initials\_Country of PhD\_Gender\_Profession**). So for a person who obtained a PhD in Ghana, who is a female and an academic with the initials of her name as HFA was saved as “**HFA\_Ghana\_F\_A**”.

The interviewees were grouped into countries where they obtained their PhDs. However, those who obtained their PhDs from **UNESCO-IHE** in the Netherlands and others who went to the Centre for Development Studies (**ZEF**), University of Bonn were also put into another family. The rest of the respondents who obtained their PhDs abroad were labelled “**OS**” (meaning overseas). Those who obtained their PHD from Ghana were labelled “**GH**”.

**The professions of the interviewees were put into four families:**

1. Academics (represented as “A”)
2. Researchers (represented as “R”)
3. Consultants, GO staff and those that worked with a government agency (represented as “NGO” or “GOVT”)

The file naming was to help to put the documents into families in Atlas.ti.

#### **4.4.3 Developing a Coding Scheme**

Coding refers to the process of assigning categories, concepts, or “codes” to segments of information that are of interest to the research objectives (Frieze, 2014). The conceptual framework drawn out of the literature review and the objectives for this thesis provided direction for the beginnings of a coding system for a thematic content analysis. In that way, coding decisions started off by looking for particular themes. As Bernstein (2000) says, “without a model, the researcher can never know what could have been and was not” (p135). This study employed an open coding with both a deductive and inductive framework approach. Code families were established and data were systematically examined to see ways in which families were portrayed. This study employed an open coding with an inductive framework approach.

Examples of codes generated are shown in table 4.5 below:

**Table 4.5 Examples of codes generated in Atlas.ti**

<b>Some codes generated in Atlas.ti</b>	
1. Access to consultancy: Media	1. Access to consultancy: Recommendation
2. Access to consultancy: Platform	3. Article payment: No
4. Access to consultancy: Personal contacts	5. Article payment: yes
6. Access to consultancy: Potential	7. Reasons for PhD studies: better opportunities
8. Benefits of networks: Sharing of ideas	9. Bottlenecks during PhD: low-engagement from supervisors
10. Benefits of networks: recommending my thesis	11. Bottlenecks during PhD: unfavourable working atmosphere
12. Benefits of networks: research findings presentation	13. Bottlenecks during PhD: lack of coordination
14. Career development next 5 - 10 years: more consultancies	15. Early Post PhD career bottlenecks: articles 16. Early Post PhD career bottlenecks: data
17. Early Post PhD career bottlenecks: funding	18. Knowledge of Predatory Journals: no
19. Career development next 5 - 10 years: more publications	20. Inst. method of uptake: none
21. Career development next 5 - 10 years: remain in the same field	22. Involvement of Government policy post PhD +
23. Knowledge of google scholar: No	24. Knowledge of article in PJ +
25. Overall uptake of PhD: Above threshold	26. Knowledge of Predatory Journals: yes



#### **4.4.4 Allocating (and re-allocating) the codes**

The codes created were refined through repetitive review of the data. During this process subcategories or new categories of themes were identified and analysis continued until no new categories emerged. The research question memo related to the research question(s) was created and linked to the various types of codes identified in the data in order to add transparency to the analysis.

#### **4.4.5 Generating networks**

After coding, the categories were refined through repetitive review of the data. During this process subcategories or new categories of themes were identified and analysis continued until no new categories emerged. Research question memos related to the research question were created and linked to the various types of codes identified in the data in order to add transparency to the analysis (see Friese, 2014).

## CHAPTER 5

### UNDERTAKING A PHD: MOTIVATIONS AND EXPERIENCES

#### 5.1 Introduction

This chapter presents the results on the motivation(s) and experience(s) of undertaking a PhD. Understanding the motives and reasons why one undertakes a PhD study helps to understand the factors that may affect the use and uptake of thesis findings. The reason why anyone undertakes a PhD, the duration of the programme and the form of scholarship obtained are all factors that should be considered in the uptake and utilisation of the research findings.

The discussions of the results are compared with earlier work done by scholars in the field of higher education, doctoral studies, research uptake and utilisation, and the field of environmental and natural science.

Following this introduction, the next section presents the results on reasons for undertaking PhD studies. Section 5.3 looks at reasons for studying within or outside Ghana, section 5.4 focuses on the selection of PhD programmes and supervisors while section 5.5 reports on the contribution of the PhD to the already existing body of knowledge. Sections 5.6 and 5.7 explain the major challenges during PhD studies and the overall value of PhD studies respectively. Finally, section 5.8 reports on the results presented in the light of relevant literature, and summarises the whole chapter.

#### 5.2 Reasons/Motivation for undertaking PhD studies

During the interviews, respondents were first asked why they undertook PhD studies. This question was asked to get a sense of the career plans and expectations of the interviewees and to establish whether there was any link between their motivations to do the PhD and later actions to optimise the uptake and effect of their study findings and recommendations. As expected, interviewees gave various reasons why they undertook PhD studies. Selected interviewees were asked follow-up questions to get a clear understanding of why they undertook PhD studies.

Reasons why interviewees undertook PhD studies can be categorised as follows:

- employment opportunity and requirement motive;
- knowledge production and creation motive;

- scholarship opportunity motive; and
- other reasons.

Each of these is discussed in turn. Each motive is defined in a subsection first, followed by the presentation of the results.

### 5.2.1 Employment opportunity and requirement motive

The **employment motive** refers to the notion that one will get a better job or promotion after attaining a PhD. In this situation, the person undertakes a PhD at all cost because of the opportunities that come with attaining a PhD, including more consultancies and promotion at work.

This subsection presents the views of respondents whose primary reason for undertaking a PhD was to have better opportunities within and outside their field of study. All quotations are presented unedited and verbatim.

Jan,<sup>7</sup> who was a senior research scientist with eight years post-PhD experience at the CSIR at the time of this research, responded that the reason for him doing a PhD was:

there is a limitation on that in terms of how high you would go with your career so I needed a higher level degree that comes along with it a broadening of your mind which then opens opportunity for a higher level career (P3, 3:2<sup>8</sup>).

He further noted:

I worked ... you had the entry level minimum being with the master's degree and then you had other people who had PhDs that have had much opportunities than you had, they got paid than you are paid, also their work, you know, got more recognition than you did so you were basically sort of supporting those that had PhDs to deliver what was recognised as their product. So you were more often behind the scene and even if you wrote the publication, by virtue of the fact that they were those that were leading the different section or thematic areas, you know, they will be first and you become second and sometimes you will not even come at all because according to them your publications wasn't counted as part of your requirement or being promoted. So I saw that as a disadvantage in keeping you down and not being able to progress in your career. So one of the best ways was to upgrade myself and get the higher degree that then would put you in the position and place you have the liberty to operate more on your own and do whatever work (P3, 3:4).

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<sup>7</sup> To ensure anonymity and confidentiality, the names used in the thesis are pseudonyms to protect the identity of research participants.

<sup>8</sup> The numbers at the end of the quotations represent the primary documents and paragraph numbers. For example, P3, 3:2 means that the quotation is from the primary document 3, starting in paragraph 3 and ending in paragraph 2.

Jan had a strong motivation for self-advancement. The institution where he was working, at the time of his research had a new employment policy where the minimum qualification in the next few years for research staff would be a PhD for those already in the system, and the minimum entry requirement for new staff. Despite the above, Jan, having a PhD also gave him some leverage in terms of quantity of work apportioned to him as compared to colleagues with PhDs. He felt he did all the work for them because he did not have a PhD. He sought to bridge the gap between himself and his colleagues with PhDs.

The **employment requirement motive** refers to a situation where interviewees undertook PhD studies because the employment policy of their institution had changed over time requiring selected staff to have PhD as a minimum qualification. In such case, the interviewees enrolled or sought PhD opportunities to secure their appointment in the longer term.

The following respondents undertook PhD studies because it was a requirement at their place of work. Since 2008, most universities and research institutions in Ghana have changed the minimum qualification for lecturer and research scientist to PhD.

Zea obtained her PhD in 2008 from a university in the United Kingdom and has been working for the CSIR Water Research Institute ever since. She has been a consultant on selected projects funded by the Africa Union (AU) and Newmont Gold Mines. Her reason for undertaking a PhD was that:

Well I will say it's for two reasons. First, to enhance my personal skills. And then, secondly it's a requirement for certain positions in the CSIR. Well, I worked with the master's for a while (P15, 1:3).

As evidenced above, Zea had multiple reasons for undertaking her PhD studies with the complementary reason of enhancing her skills in research. However, the major reason was that for her to progress in ranks at her institute, she needed to obtain a PhD and that motivated her to undertake it.

Harrie obtained his PhD in 2010 from a South African University. He has been working for the CSIR Water Research Institute as a principal research scientist ever since. His reason for undertaking PhD studies was:

I did my National Service in 1989. I started working from 1990 ... you could come here with a first degree as an assistant research officer .... Before you become a research officer you have to do the master's, but recently now, you can't enter with the master's. If you don't have the PhD, you can't be employed here. Those who are already employed don't have a PhD, they

are being encouraged to, given some time to do that so ... I knew that there was going to come some problems that is the more reason why I did the PhD (P1, 1:6).

Harrie's motivation was mainly because his institute gave scientific staff time to obtain a PhD to secure their positions at the institute. Unlike other interviewees who had other reasons for pursuing PhD studies, Harrie wanted to undertake PhD studies to secure his position at his work place. This is reflected in his PhD outputs after studies. He published fewer articles than other interviewees in academia and research and he works mainly as a consultant.

Willem graduated with a PhD from the Centre for Research Development (ZEF), Bonn and has been a consultant on most of the German government programmes on postgraduate studies in Ghana since 2009 and at the time of this study, he was a senior lecturer at a public university outside the Greater Accra region of Ghana. Willem had a masters but also undertook PhD studies because a PhD became a requirement from his organisation. He noted that another reason why he undertook a PhD was:

in the first instance, as a requirement in my university where I work, you will need a terminal degree (P2, 2:1).

Lenny obtained his PhD in 2007 from UNESCO-IHE. He was teaching at a university after his masters degree and when he was nominated by his institution for a PhD, he accepted the nomination because he was working at a university and to secure his position and rise through the ranks, he needed to undertake a PhD:

I think from what I did, it was because I was working in the university. As an academic, that's the basic thing you need to do then you build on as a researcher (P8, 1:3).

Luan obtained his PhD in 2013 from the University of Ghana. He was working as an academic staff member of the university before starting a masters degree at one of the public universities in Ghana. He continued with his PhD studies immediately after completing his masters. His reason for having undertaken a PhD was:

because of where I find myself, my job. Previously, to become a lecturer you needed a minimum of a master's degree. When I think this single spine salary structure came to replace the old pay structure, the minimum requirement now is a terminal degree, which is a PhD. so those of us who were already employed with the masters were encouraged to go back for the PhD if we want to secure our jobs. That is basically why I did it (P10: 1:2).

Laun's primary motive for doing a PhD was because it was mandatory for the security of his professional career.

All the responses reflected this section were given by interviewees in academic and research institutions. Most of the interviewees were already working at their respective institutions before they started their PhD studies. Studies were undertaken in order to secure their positions in their institutions. This was in line with the change in the employment policy of academic and research institutions across Ghana and the world (CSIR Annual Report, 2012; University of Ghana, 2014). Experts and managers of these institutions believe staff obtaining PhDs would increase the quality of teaching and research (Cloete *et al*, 2015).

### 5.2.2 Knowledge creation and production motive

The knowledge creation motive came into play when the interviewee undertook PhD studies to broaden his/her horizon to contribute to knowledge in the field. Some respondents indicated that their main motivation was to gain more knowledge in their field of training.

Willem graduated with a PhD from a university in Germany in 2009, and he was a senior lecturer at a public university outside Accra at the time of this research. He noted the reason why he undertook a PhD was:

as a physical geographer, (I) just wanted to continue to understand the physical (processes) that goes on within the country. A lot of research have been done on human aspect but in terms on physical aspect and the interest is to look at the transition zone or the savannah zones since they are much more stressed in some ratios (P2, 5:5).

Willem wanted to undertake a PhD to ensure continuity in the field he studied for both his first and second degrees. In addition, he identified a gap in earlier research done in the area of expertise and wanted to investigate that, and thereby create new knowledge in the field of physical geography.

Janco, a senior lecturer at the Faculty of Renewable Natural Resources of the Kwame Nkrumah University of Science and Technology (KNUST) with over 15 years experience of teaching and supervising postgraduate students, stated that the reason why he undertook a PhD as:

By then I had done MPhil & MSc so my desire to remain in research of course to develop more skills for research also actually motivated me (P9, 3:1).

Janco's primary motivation for undertaking a PhD was the need for him to enhance his research skills if he was going to remain in the field of research at the university. To him, the only way he could do the above was to enrol in a PhD programme at the university.

Danie was a senior lecturer at a private university in Ghana with six years post-PhD teaching experience. He noted the following as the reason why he undertook his PhD:

it's to contribute to knowledge and then I think once that is the highest level of education, in that regard. And most especially in the field of environmental related issues, I think it will be appropriate to have that knowledge by getting a PhD (P11, 4:1).

Danie wanted to create new knowledge in the field of ENRS. He believed he could only contribute that knowledge by undertaking PhD studies because a PhD is the highest level of education. In all, he identified PhD studies as the appropriate means of gaining the knowledge he needed for self-advancement in his field.

Kai was a seed scientist at the CSIR. He obtained his PhD in 2010 from a Ghanaian university. His motivation for undertaking a PhD was to broaden his horizon and by extension to be an expert in the field of seed science:

To broaden my horizon at my area of expertise like seed science. After MSc, if you go on to do a PhD it makes you more competent at your area of expertise. And also it's a requirement for our institute, council for scientific and industrial research. Now the requirement is that every scientist should get a PhD. But even before this requirement came, I decided to do it. Because I knew a PhD will be very important for me to progress. But as at now council scientific and industrial research, you need a PhD to be employed as a research scientist (P18, 1:3).

Kai undertook a PhD because he believed that it was the only way that he could become an expert in the field. He had other reasons for undertaking a PhD: to meet the minimum job qualification requirement of his institute. In addition, the employment policy for his institute had changed with the council requiring most scientific staff to have a PhD as minimum qualification. He believed having a PhD was going to ensure his progress in the institution.

Jan was a senior researcher scientist at the CSIR with eight years' experience after obtaining his PhD. He alluded to self-development as the reason for undertaking the PhD:

it was part of upgrading myself for a better career because the master level studies had a limitation in terms of the amount of knowledge that was gathered at that level (P3, 3:1).

Like Kai, who worked at a different institute of the CSIR, Jan's other major motivation for undertaking a PhD was to upgrade himself in the field. He believed that one major way of improving his knowledge in the field was to undertake a PhD due to limitations of the amount of knowledge one acquires at masters level.

Thys worked for a government regulatory body in forest management. He had obtained his PhD from a Ghanaian university. He was a part-time lecturer at the university when he decided to undertake PhD studies in the same university. He had multiple types of motives for having undertaken a PhD. His additional reason was that acquiring more knowledge through PhD studies puts one in a good position to make meaningful and relevant suggestions during discussions pertaining to the field. Another motivation for him to undertake a PhD was that most people he met at international conferences had a PhD. He later mentioned that he was also planning to move into the academic field to teach after obtaining a PhD. He narrated as follows:

I thought that, besides that looking at the field of study that I had chosen, in all the international meetings, I went to I participated in, I realised that most of the people had the PhD you know and even that aside, I also realised the more educated people were the better their suggestions in doing or their input in doing discussions you know so I thought that on acquiring more knowledge, well, is more important (P14, 2:3).

Ruan obtained her PhD from a university in the Netherlands almost three years before the interview. She worked at the CSIR before and after her PhD. Her complementary reasons for undertaking a PhD were to improve the quality of her research skills and also to meet the new employment policy of her institute, which required research scientists to have a minimum qualification of a PhD:

well first of all, I will say that I work in a research institution and then having a PhD, we all know improves your skill to undertake quality research. Of course when you do that you increase your knowledge too in the area of hypothesis testing and you know analysis and stuff like that. So, especially those of us in research institution, you'd want to do a PhD to improve your skill and knowledge. That is one but then the other factor has to do with you know researching on something and you know coming up with something that is really associated with you. I mean you're able to deal with a particular problem and then maybe in your lifetime here as a researcher you can continue working on that particular problem. So basically trying to also come out with some new knowledge that can be applicable and for me I had had an opportunity of working with the communities and doing a lot of things on the ground and so I wanted to do something that would help to solve an emerging problem in the country. so basically the first motivation in studying is you're a research scientist and you need a PhD to further your career and then also by doing that helps you to address a particular problem that maybe becomes associated with you and then throughout your career you know you can work to improve upon it or something like that so that's basically the motivation (P13, 13:1).



She believed undertaking a PhD was going help her address a particular problem she had identified in the field. If the problem could be addressed through PhD research, it was going to help scientists in carrying out further research in the field during their career after obtaining the PhD.

The interviewees reported on above, were all from an academic background or from research or a government regulatory body. The motivation for the interviewees in academia and research to undertake PhD studies were almost the same, namely a focus to improve their research skills and knowledge in the field of their profession and, in addition, to maintain their positions at their work places.

The **knowledge production motive** refers to a situation where one has identified a problem and then wants to find a solution to it. Such person's main motive for undertaking PhD studies is to add new knowledge to the already existing body of knowledge.

The interviewees in this research undertook their PhD studies because they identified a problem in their field or a related field and wanted to investigate the problem and make recommendations for possible solutions.

Nico obtained his PhD in 2006 from a university in Germany. He returned to Ghana and worked for the government ministries as a technical staff and later as a consultant on several projects for the Ministries of Health and Fisheries. He was a focal person for several projects on environment and climate change undertaken by the government of Ghana. His reason for undertaking a PhD was:

the idea was to see first how the knowledge I acquired could be applied to solving problems that are relevant for Ghana. As at the time one of the key issues was solid waste management and still it's a case. So I took it up ... I think it's a drive towards trying to find solutions for the challenges, environmental challenges confronting natural resource management and environmental challenges confronting us as a country. So I will say basically that's the reason why I decided to pursue (P20: 1;3).

Nico identified the problem in managing solid waste management in Ghana and wanted to find solutions to that problem through his PhD research. Unlike other interviewees who had multiple reasons for undertaking PhD studies, Nico just wanted to find solutions to the problem of solid waste management.

Samuel obtained his PhD from a public Ghanaian university and worked for a non-governmental organisation (NGO) for most of his professional life. He retired the same year he obtained his PhD. When he was asked why he undertook a PhD, considering his age when he enrolled and where he had worked, he said:

So I became so curious if this is what the evaluation reports are saying. Why don't I also go into research and find out the reality of what is actually happening and I had a whole field at my disposal, anyway, 8 districts. Eventually, by 2005, when I was starting, I was in charge of the whole eight districts.

So when after the evaluation she said, "[l]ook you people have so much data, why, are you not interested in a PhD?" Oh, but I brushed her off and then unfortunately too her database on her computer crashed so she lost all her data. So she came back "Are you sure you people you don't want to pay me?" and I said, "Madam, but what are you talking about?" (P5,1:28).

Samuel was involved in a project with other consultants who were lecturers from the university. He decided to undertake a PhD after he had identified a problem in an evaluation report for his organisation. He wanted to investigate the problem and make some recommendations and suggestions to stakeholders in that field.

Gert was a research scientist at the CSIR Water Research Institute and a part-time lecturer at the Department of Civil Engineering at KNUST at the time of this research. His PhD was very different from the courses he read for BSc and MPhil. When he was asked why he undertook a PhD, he said:

When I finished my master's here in Legon I decided to work with a private consultancy company and that company was an environmental consultancy company with the head office in the USA.

It had its head office in the USA and another one was opened here. I happened to be the only employer because I started with them from scratch. So because I started with them from scratch, I was doing virtually everything. Every aspect of whatever job they do: the environmental management plans, the water audit, energy audit, every Environmental Impact Assessment (EIA) anything that comes, I'm the one who has to do it. So I had to learn very quickly. Meanwhile that was not what I studied in school for my master's. So I had to learn very quickly. And one of the things I noticed was that most companies did not have treatment plants to treat their effluence. Yet they were supposed to report their monthly effluent returns to the EPA and we were doing that on their behalf that is our clients. So at a point in time we had some contacts in Australia and wanted to build a small treatment system for small and medium scale industries but for some reason that I do not know, that plan never materialised. After doing the costing and all the ground work it couldn't take off. But I realised that even that we were aiming at a very modest cost but I think it was still very expensive by my estimation at the time. So in my small mind I told myself that why isn't it possible for us to develop our own local

technology that can treat waste water at a very reasonable cost for industries because there seemed to be a very strong need and that was where my interest in waste water treatment came off. (P7: 1, 8).

Clearly, Gert identified a problem whilst working for a private firm. His strong motivation for undertaking a PhD was to find a solution to the problem he had identified. He had no desire to join the academic world or to do research after his PhD. He just wanted to investigate a problem and generate new knowledge in the field.

Luan obtained his PhD in 2013 from one of public universities outside Accra. He was an acting dean of a faculty in another university outside Accra at the time of the research. He had a primary reason for undertaking a PhD but also undertook the PhD because he had identified a gap in his field that needed further investigation:

In Ghana, the field that I choose, fisheries science in Ghana, because Ghana is a coastal nation, most people are into the marine aspect and where I find myself. I decided to major in the fresh water fisheries. Then I realised that they were impounding the Black Volta at Bui. I thought it was an interesting thing to study. That was why I registered in Ghana and to undertake that study (P10, 5:12).

David was part of the group of PhD holders who graduated under the GLOWA Volta Project of the ZEF. He obtained his PhD in 2012. At the time of this research, he was a lecturer at a public university in Ghana. When he was asked why he undertook a PhD, his reason was that:

we've always had challenges in the system, where it is said that we lack knowledge in so many aspects. I thought building my capacity further would enhance me to understand ways that I could further investigate into problems that we have across the region with the aim of finding lasting solutions to it. Mostly that had been my passion and my motivation as well (P17, 1:2).

As reflected in the quote above, David identified a lack of knowledge in his field of practice, and for him to understand the problem better and to find solutions, he needed to undertake PhD studies. In other words, he wanted to investigate the problems and generate new knowledge in the field that would help solve the problem.

The interviewees reported above were all working in academia or research and one worked for an NGO just before graduating with his PhD. In summary, generating new knowledge to add to the already existing knowledge in the field was their motivation for undertaking PhD studies.

### 5.2.3 Scholarship opportunity motive

Other respondents undertook their PhDs because they were nominated by their institutions or by their supervisors to enrol for a special programme.

Nigel obtained his PhD in 2011 from UNESCO-IHE in the Netherlands. At the time of this research, he was head of the Department in a newly established public university in Ghana. His motivation for undertaking PhD studies was that he was nominated by his university:

So when I was doing my MPhil, I was almost done when the Civil Engineering Department got a project called staff capacity building project. And in the field of water resources management and then my MPhil was in that. And they wanted four lecturers to go and do PhD in water resources management. At that time, they had two from the department; they were looking for another two. So they got one from the maths to do hydro-informatics and then they said that I should quickly try and wrap up my MPhil. I was then one and half years into my MPhil. So I quickly put down my thesis together and then I was enrolled ... I was then given the opportunity to go and do the PhD to come back and lecture at the department. So that is what actually got me into doing the PhD (P21, 1:2).

Lenny, who was a senior lecturer at the department of the university that nominated him to go for his PhD, mentioned:

What happened was, I was nominated, so I did my master's at the department actually as staff development (P8, 3:10).

All the responses in this subsection were given by interviewees in the academe and although they had other motivations for undertaking a PhD, their primary reason for undertaking PhD studies was that they had that opportunity from their department and took advantage of it.

### 5.2.4 Other reasons

There are other reasons why one may undertake a PhD, including seeking societal recognition and self-actualisation. The interviewees in this subsection's motive is to gain recognition from society for attaining the highest academic qualification and have the title 'Dr'. Other reasons given by selected respondents on why they undertook PhD studies include:

- **Personal interest and self-actualisation**

Harrie, a research scientist at the CSIR said that, apart from his employer's requirement to study for a PhD, he also wanted to fulfil his desire to be a PhD holder. The following quote illustrates this:

Also I had the desire in my heart to do it (P1, 2:8).

Danie a lecturer at a private university in Ghana mentioned that another reason why he wanted a PhD was that he had a long-term desire of becoming a professor and the only way to become one was to do a PhD.

I was thinking of becoming a professor one day (P11, 5:7)

This part of the subsection above reports on interviewees who were working in academic and research fields.

#### – Encouraged by supervisors

Another reason why some participants did their PhDs was that their supervisors encouraged them to do so.

Anje worked at a governmental agency which focuses on advocacy and programmes. She obtained her PhD in 2010 from KNUST. Her reason for undertaking the PhD was:

My supervisors during my national service encouraged me you know they were like why don't you enroll for a PhD. At that time there was this vice-chancellor's special initiative where there were encouraging young undergraduates to enroll directly into PhD programmes. So they said you should do MPhil and then you can easily convert it to PhD and so on. But then we were looking going out of Ghana and do your master's and stuff like that. So I felt it was great so I felt the first thing was like, why don't you develop a proposal? What exactly do you want to do? And I started thinking wide Maybe I was going too fast. So I decide to buy a KNUST form and I then I applied for the special initiative and then I got enrolled. So that's how I got into (P16, 1:4).

Anje undertook a PhD because her supervisors motivated her to do that. She developed an interest in research whilst she worked as a research assistant at the university. She was encouraged to start with a masters degree (under a special initiative by the then vice chancellor). She was also the only interviewee who decided to do a PhD directly after her bachelor's.

### 5.2.5 General discussion

The motives and aspirations cited by interviewees validate several of the categories identified in the existing limited literature, such as improving career prospects, personal development, and intrinsic interest in their discipline (Brailsford, 2010). In addition, the data supported the 'conjecture' that candidates undertook PhD studies with multiple motives. Chill and Sanders

(2007) established five generic reasons for wanting to undertake PhD studies: career development, lack of current job satisfaction, a personal agenda, research as politics, and drifting in. Leonard, Becker and Coaste's (2005:139) study titled "To prove myself at the highest level – using the Education doctorate as a case study" discerned from their interview data the "powerful aspirational value of the doctorate". This desire of education doctoral holders shows that they underscore both personal growth and training and qualification motives (Brailsford, 2010).

Gill and Hoppe (2009:31) propose five motivational 'profiles' (and an associated personal objective) that could lead an individual to doctoral study, namely –

- 'traditional' (entry into academia);
- 'advanced entry' (professional development);
- 'continuing development' (professional advancement);
- 'transition' (entry into a new career); and
- 'personal fulfilment'(self-enhancement).

They also suggest that the first four profiles accord with different career stages: 'traditional' and 'advanced entry' relate to early career stages while 'continuing development' and 'transition' relate to mid- to late career stages. The final profile, 'personal fulfilment' could apply to individuals at different stages of their career.

Generally, all interviewees who worked in academic and research institutions undertook PhD because of the change in appointment policies of their respective institutions. Although most of them did not mention that as their major reason for starting a PhD, it was their concern to secure their appointments. The reasons given by the interviewees from the universities and research institutions on why they undertook a PhD were in line with views expressed by Cloete et al. (2015), Altbach (2004a) and Tijani (2013) that African universities in their quest to become world-class institutions are requesting most of its academic staff to have a PhD by the end of 2018 (as stated in most of the leading African universities' strategic plan such as that of the University of Ghana and Ibadan).

Few interviewees identified problems during their professional lives where they wanted to use their PhD studies to find solutions to the problems. These particular interviewees ended up applying their recommendations (as a form of research uptake is discussed in the next chapter). In addition, it was observed that these interviewees did not have the same subject

background for their PhD studies as for their masters' degree. They moved into a new area all together.

Only three of the respondents (undertook a PhD because they were nominated by their institutions. Two of these were trained under the UNESCO-IHE programme. This programme is directed at staff at universities (UG, 2012). This provided an opportunity for the interviewees to study for a PhD. When institutions nominate staff for doctoral studies, it helps the staff to specialise in a field relevant to the overall mission of their faculty. Such students help in training the next generation of experts in the field locally, which is a good method to apply what the person had studied.

Most interviewees undertook PhD studies because they wanted to broaden their horizon and acquire new knowledge in the field. Throughout the study, the respondents seldom used the phrase 'add knowledge to the already existing body of knowledge', which is the core aim of doctoral studies (Jebuni,1998). Interviewees rather did not want to gain knowledge, which affected the uptake of their research recommendations. The study found that interviewees who believed they would gain new knowledge from their studies were pushing for the uptake of their findings and recommendations.

Interviewees with PhDs and working as consultants and staff of NGOs had an initial plan of entering into academic or research institutions after obtaining a PhD. It was clear from their responses that they looked forward to joining either the university or a research institution. The above buttresses the point made by Stephan (2011) that most PhD holders look up to tenures at universities, and the view by Hacker and Dreifus (2011) that PhD production has far outstripped the demand for university lecturers.

Overall, the reasons interviewees gave on why they undertook PhD studies, varied. However, results from the study showed that the demand for PhD is rising, with people who are not even in academic and research professions acquiring PhD degrees.

### **5.3 PhD studies in Ghana and outside Ghana**

Interviewees were asked where they deemed best to have studied for their PhDs. Most people believe studying for a PhD abroad has an effect on the type and quality of one's research during and after obtaining a PhD. In addition, interviewees believed undertaking a PhD abroad gives one opportunities to present your findings during and in some cases after studies. Even

interviewees who obtained their PhDs in Ghana tried several times getting admission and full scholarships to study outside Ghana.

Piet who was working as a consultant after his studies and who obtained his PhD from a Ghanaian university says:

yes, I always considered going abroad for a PhD (P6, 11:12).

Janco also obtained his PhD from a Ghanaian university and was teaching at a public university in Ghana at the time of the study. He wanted to study for his PhD outside Ghana but because of financial limitations, he could not. He mentioned:

I did try several times to get admission. I did get the admissions. I tried applying for scholarships but wasn't successful (P9, 9:6).

Harrie obtained his PhD from a university in South Africa almost six years after his master's degree. He wanted to do a PhD abroad in order to experience doing research in another country:

ahh well, that was an option but I think it's always an experience to try to look at the other areas and then also to change the environment and see how research and teaching are done out there. Because normally in different environments, different people, its puts a lot of flavour in the work you do rather than to do everything in one place (P14, 14:4).

Similarly, Willem obtained both his first and second degrees from the same university in Ghana and wanted to know how research is done in universities in Europe:

I have studied my master's and first degree in Ghana and wanted new ideas in doing things and also broaden my horizon. Above all, establish a network of colleagues (P2, 2:5–8).

Apart from knowing how research is done in universities outside Ghana, Willem believed that doing a PhD abroad gives multiple benefits, including establishing good networks, which could help one's career development after studies.

Gert obtained his PhD from UNESCO-IHE in the Netherlands. At the time of this research, he was working for the CSIR as a researcher. Like Willem, who undertook his master's in Ghana, Gert also wanted to study abroad because he felt the quality of PhD education in Ghana was not good. He narrated:

Well I felt that I had my first degree in Ghana, second degree in Ghana and I was just tired of Ghana! Ghana! Ghana! education. I felt that doing a PhD in Ghana was a waste of time. even though I had not done PhD at the time), I had witnessed when I was doing my master's, a few



PhD viva at the university of Ghana and I wasn't impressed with the output, so I felt well let me do it outside (P7, 7:4).

Zea, who also graduated with a PhD from a university in Germany and who was working at the University of Ghana, said that, after obtaining both her first and second degrees in Ghana, she needed to travel out of the country for her PhD. To her, studying outside Ghana at PhD level meant gaining some exposure. She said:

because I felt I needed to go out a bit. After doing the first degree in Ghana, second degree in Ghana it's always good to have an experience abroad and that's what I tell my students that is always good to go out a bit and come back after your studies. I think it's always good, that international exposure is always good. Well it's good for networking. Yeah, I think that's the main thing you get to meet people and now even when you come back you are putting together proposals, you know, you need to respond to calls". (P12, 12:7–9).

In addition to getting exposed to how research and teaching are done abroad, Zea mentioned that studying for a PhD abroad gives one an opportunity to network with others in the field for future career development.

Ruan's motivation was to improve her skills in her field. She wanted to undertake a PhD abroad because that was the only way she believed she was going to improve her research skills and her knowledge considerably:

well I had done my BSc in Ghana. I had done my MPhil in Ghana and I really wanted to expand my horizon and my exposure. I had done prior to that a number of courses abroad at least I had done 3 courses in the USA and you know I've gotten exposed to you know how things were done and I wanted really something you know very different. I was given an opportunity even to do a PhD, a PhD here like write all my, do all my research here. Write all my articles and then later it was it would be submitted to a university in Japan. Somebody invited me on a project like that but I had to refuse because I said I really wanted a PhD outside. So a PhD if I was going to do, it has to be outside because I wanted a different experience. I saw that the way then people, the professors outside taught were different; you had available resources like you know they subscribe to a lot of journals; Internet is really very fast and I really wanted to use PhD to improve my skill. that was what motivated me to want to have a PhD outside. And then also I've ... didn't want to have 3 degrees in the same university (P13, 4:10).

Ruan's experience on the quality of short courses outside the country was also a factor which motivated her to seek a PhD opportunity outside of Ghana. She believed universities in developed countries had facilities which aided research and PhD studies. These facilities were difficult to come by in Ghana. This makes undertaking a PhD very difficult in terms of access

to literature and scholarship and even working space during PhD studies.

Zonja's experiences during her undergraduate project work in chemistry made her lose interest in pursuing any further studies in Ghana. She wanted to study at a university where access to equipment for her research would be easier than her experiences during her undergraduate studies in Ghana. She narrated as follows:

My first degree was difficult. With my project work, I had to bring samples to then the water research institute. But then there was Institute of Aquatic Biology those times. And there was the Water Resources Commission which was merged to form the Water Research Institute in 1996. So before then, the Institute of Aquatic Biology had the equipment I needed for my project work at the university. Because the university didn't have the equipment then. So I remember I had to take samples, I had to bring them down to Accra and sometimes you are eager to get your results and it's not coming and you can't write, you can't do anything. So after all that I decided I will not do any studies in Ghana again. I thought the facilities will be there. I mean between my first degree and my master's was like six years or so. Because I was determined not to do any master's in Ghana. In terms of research equipment. Maybe what motivated me was when I started work I think two years after, I went for a programme in Canada. It was for like ten weeks' programme in Dalhousie University. It was a training programme on the exclusive economic zone. I saw what was there and it more or less confirmed what I had always suspected or believed in. so, maybe that motivated me further more to just study outside (P15, 4:5).

David was a lecturer at a public university outside Accra at the time of this study. He obtained his masters degree from a university in Japan. Experiences of his colleagues and friends who did their PhDs in Ghana convinced him not to undertake his PhD in Ghana. PhD students at Ghanaian universities experience many challenges, including the longer duration to complete their studies:

well, for so many reasons. Firstly, I thought the timeline when people used to do their PhDs actually was quite troublesome. It takes quite a time to complete and that could be attributed to, I would say inability of some supervisors to actually look at the work being done by their students. So there is not a timely graduation of the student. Besides, resource wise we tend to be limited. When you're doing your PhD here you need to finance basically everything from your own pocket and given that I was just a fresh graduate in the system, I hadn't worked for any year or something I would hardly be able to finance that. So it is based on the timeliness of completion and the inability to finance my own research that also triggered me to go there (P17, 3:12).

Nigel obtained both his first and second degrees from the same university in Ghana. His supervisor during his masters advised him that it would be good to change environment for his doctoral education. His motivation for undertaking his PhD studies outside Ghana was due to the advice received from his supervisor:

What I wanted was a change of environment actually. Having done my first degree, KNUST, second degree also had it KNUST. Even during the MPhil, I had the opportunity to upskill the MPhil to PhD during the Vice Chancellor's programme, MPhil leading to PhD. I then went to discuss with the dean of graduate school. Then he advised me that it would be better for me to have a change of environment. And he talks also then that my MPhil was not something that could be up skilled to PhD. And then, talking also to the Dean, said I may have a parochial view at the end of the day if I do everything in one campus. So it would be very good that I have an experience outside Ghana. And I really think that the advice was very good for me because I learnt a lot (P21, 3:6).

Out of the 20 interviewees, only four (Lenny, Nigel, Luan and Piet) never applied to universities abroad before starting their PhD studies. Luan, who did his PhD in Ghana, believed, that although studying outside for a PhD would have been the best after obtaining two degrees in Ghana, said his research was more localised and it was therefore better that he did his PhD in Ghana.

All the interviewees agreed that to undertaking a PhD gives one the exposure needed in a professional career and also builds research skills. Only five of the interviewees (25%) thought of networking as a major factor for undertaking their PhD outside.

Undertaking a PhD abroad has a direct positive effect on one's career and skills after the studies. In most universities in developed countries, PhD students are given opportunities to attend conferences and workshops to present part of their thesis work during and after their studies. This is a good opportunity for research uptake.<sup>9</sup> In some cases, students are required to publish before graduation and that enhances their visibility during and after their studies.

However, to undertake PhD studies in developing countries, like Ghana, has its own challenges. The unsuitable timeliness, the lack of facilities and funding opportunities are some of the challenges that discourage students from undertaking their studies in Ghana.

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<sup>9</sup> Discussed further in Chapter 6

## 5.4 Selection of PhD programme and supervisors

### 5.4.1 Why the field of study?

The field of Environment and Natural Resource Sciences is a broad field. It is an integrated field, which involves subfields from different fields (Enger and Smith, 1995). Interviewees were asked why they opted to pursue a PhD in the field they did.

Harrie who undertook both his first and second degrees in earth science and who was a research scientist at the CSIR Water Research Institute, did a PhD in earth science to ensure continuity in the field:

I did my first degree in earth science; second degree in earth science, so obviously I was going to continue (P1, 1:3).

Jan who had a masters in ecological engineering and worked in the field for two years after his graduation, undertook a PhD in the specific field, because of his interest in the field:

I mean my interest all had to do with some bit of engineering in physical science and research (P3, 3:6).

Jan wanted to remain in his field of interest and did not want to shift to another subfield.

Like Jan, Piet also pursued a PhD in the field he did because of his interest. Jan wanted a linkage between his masters thesis and his PhD work:

I had many topics but I think the topic of migration has remained paramount to my interest and I did the same for the master's. And I also then linked migration to the environment in the PhD so it is not a complete shift (P6, 2:6).

Lenny, like Piet and Harrie, pursued a PhD in their selected fields to ensure continuity:

I did a first degree civil engineering and my master's was in sanitary engineering which was more of water and environment waste water sanitation so I thought it make a sense to do a PhD in the same area (P8, 2:5).

Although his PhD was in the broad field of water engineering, Lenny's thesis research was in a subfield which was not really linked to his area of specialisation like his masters degree. His PhD thesis was mainly on policy in the field and not on pure engineering.

Janco pursued the specific field for his doctoral studies because that was the field in which he had been working over the years. At the time of the interview, he was also teaching in the same field:

it was there I got more into cocoa agroforestry. In fact, I did an MPhil in agroforestry. When I actually came here to work I was still on agroforestry project that was how I got into contact

with agroforestry (P9, 4:10).

Luan's motivation for a PhD in the same field as his master's degree was to specialise. To him, specialisation in the broad field of ENRS was important to his profession:

with our career, in academia you try to specialise in a field. So you can become a professor in a particular field. So when you tailor your studies and research towards a particular field it helps you understand your field and become an authority in that field instead of you do perhaps a general master's and later narrowing too but once you just chart a particular course it helps you become an authority in that field (P10, 3:6).

Danie chose his field of study because he wanted continuity in his work and therefore continued with the work he did for his masters degree:

All that I knew was that if I was going to pursue further studies, it should be related to what I've already studied (P11, 6:27).

Kai pursued the same field he studied for his undergraduate work and his master's degree. He wanted to accomplish his vision of being a soil scientist. He also had a PhD scholarship in the same area he wanted to pursue:

Actually I've always loved to be a soil scientist. I had a very good breakthrough during my master's degree studies in Japan, so I leveraged on that and then thought well because I would want to have other research conducted in other countries besides where I have originally studied then, that made me to go to ZEF because the Director then was quite good with regards to soils and I wanted to study under him (P17, 2:6).

Kai pursued the same field for his doctorate as for his undergraduate studies and masters studies. His notion for a PhD in the field was to make him a specialist in the field:

Yeah to study more about seed science. Because MSc, I had some knowledge. But I think PhD will give you more command over that area. I was posted to the seed section or the seed division. So there was the need for me to build up my expertise at that area. Because as a forestry research institute, one of our functions is to supply seeds for propagation and also in the area of plant cultivation, knowledge of seed is very important (P18, 3:7-9).

Ben pursued a PhD in the field because of the experience he had gained in the field by working in that area over the years. He wanted to pursue a PhD in the field to become a specialist in the area:

Actually, my background is in apiculture. I am an (entomologist). And through apiculture, that's bee-keeping, agricultural science, I came to TCC [Technology Consultancy Centre] way back 1985 and so I have been training people and bees and so I really had interest in that area. Then

to my surprise I wrote to my friend in University of Reading and he told me, Ben, if you do that it means you are not organised. It was a very frank statement that shook me so I decided I will settle on it. Then as I went on I realised that well, if there's such a gap, the it means the gap must be filled. Fortunately, it coincided with a project I happened to be a partner, conservation, it was a project with [...] conservation and management of pollinators for sustainable agriculture through an ecosystem approach. Actually it was between, Cape Coast University, KNUST, Forest Research and Cocoa Research Institute, funded by FAO (P19, 3:5).

Initially, Ben was not certain whether he was working in the area he wanted to pursue for his PhD. He was also encouraged to work in the field of his PhD studies because of recommendations from a colleague and a project on which he was working.

Unlike many interviewees who wanted to ensure continuity in their fields, when Gert was asked why his PhD field of study was very different from what he did for masters and undergraduate studies, he mentioned:

I didn't go back to the field I did for my master's because it was boring and not challenging (P7, 2:9).

Gert's PhD was a total shift from his first and second degrees. He wanted to pursue an area of his interest although it had not much linkage with his past academic qualifications. The shift in the field for doctoral studies extended his studies to almost six years but gave him better opportunities in terms of getting a permanent job and also consultancies after his PhD graduation.

Zea's background before her PhD studies was in natural sciences. However, the shift in field during her PhD into social issues came about due to her line of work after her masters programme and also her interest:

because my problem [...] not a problem but just an opportunity. I come from a natural science background. But then somewhere along the line I fell more interested to look into social issues (P12, 3:49).

Similarly, Ruan pursued a different field during her PhD studies from what she studied during her masters and undergraduate programmes. Unlike Zea and the others above who shifted into a different area for their PhD, Ruan's choice was mainly to fill a gap in the field she saw and that would need people in future:

Meanwhile I had come here to work on biological conservation and so I thought it that well then having the core science should be the basis for all the socioecological economic things that we do and so I decided that I would go into core ecology, so that as the older people are leaving

the system we'll have people to replace, so that was one of the motivation for me to also go into the hard core ecology as against the original management kind of stuff thing that I did (P13, 2:4).

Thys worked in the field of conservation and wildlife before and during his PhD. At the time of the study, he was also a part-time lecturer at the same department and at the same university when he started his PhD studies. He wanted to ensure continuity in the field so he pursued a PhD in that field:

basically because you know before I started I was already working in Wildlife. So I thought that okay, I needed to do something that I will benefit me in my profession because of fieldwork I saw the gap in the area in some of the things I could do you know. So I thought that if there were all these gaps, why don't I fit myself somewhere you know than go into an entirely new field again (P14, 3:9).

Although his PhD was in the general field of his studies, his PhD thesis was not on the specific animal species, which he had studied over the years. Thys worked on a different species because, at the time he enrolled into the PhD programme, there was a project on the species on which he was working.

Anje shifted into a completely new field for her PhD. This came about because, at the time she wanted to enrol for her PhD, the field she wanted to pursue was very new to the university. In addition, the field was interdisciplinary so she needed supervisors from selected faculties within the university. She pursued the field because of her interest, although it was a completely different field:

yeah at the time what I wanted to do, there wasn't really a department that was offering it, it was more of climate change, sustainability and stuff and at that time the department of biology was running and MSc in environmental science and unfortunately they were not doing the PhD bit. You see that was the best place I could go to. Even though I did more of sustainability, climate change, water resources management but though it was the department I deem fit and that I could fit in. I sat with those doing MSc in environmental science, did the courses with them, wrote exams with them and took my exams results and started a PhD (P16, 3:10).

Nico's doctoral study was slightly different from his masters programme. He pursued a PhD in the field of waste management. The area of his PhD research was discussed in a serious national debate at the time, and needed further research to make recommendations to government and other stakeholders:

Because at the time, it was one of the key challenges facing the country, Ghana, was solid waste management. It has always been viewed as the degree to which this has been managed

successfully has been an index of development. So if you look at developmental history, you realise that even now the developed countries have had problems with solid waste management. But coming from our perspective, if we are to learn from the experiences of others, we don't have to go through the same challenges. So I thought directing my attention towards solid waste management would provide some policy direction for our country. So that's the more reason why I went to pursue a PhD in that area (P20, 2:5).

Nico's notion of pursuing a PhD in the field was not to ensure continuity in his area of research but to find a solution to a problem.

Nigel had a strong interest in the field in which he pursued his PhD studies. His motivation for going into the area was mainly a result of his interest and how easily he could relate it to his father's interest:

I ended up doing civil engineering. When I reached civil engineering for final years, I think I had two interests: structural engineering and water resources engineering. But the water was so strong because I could relate it to the farming that my dad used to do at home so my interest was much more with the agric, like apply water with the agric. So this was where the water actually developed the final year. But I was very good at structures. And the then Dean was a structural engineer always wanted me to do structures. He pushed me but I didn't even listen. But eventually, I realised that I have thrown my maths away and I can't forgive myself (P21, 4:10).

Although he was still working in the field at the time of this research, he wished he had studied the area which he loved most.

Interviewees identified the need for continuity as the major motivation for them to pursue the fields they chose for their PhD studies. Some mentioned the gap they identified during their line of work and the need to find solutions to national issues. Overall, just three interviewees (15%) mentioned the need for specialisation as the major factor for them to pursue a PhD in the field they did. The field of ENRS is a broad field and throughout the study, it was identified by most of the interviewees who undertook their studies in a slightly different subfield which, however, fitted into the broader field. This does not make them specialists in a subfield. Specialising in an area makes one an expert in the field, it encourages one to pursue further research in the field after graduating, and also helps in publishing in the field. There is therefore a need for PhD students in this field of ENRS to consider specialising in a subfield.



### 5.4.2 Selection of supervisors

A critical aspect of doctoral studies is the selection of a supervisor. Supervisors are important as they mentor PhD candidates to become experts in the field they are pursuing. In some cases, supervisors enjoy a good career trajectory for their students after their studies. The supervisors may also facilitate the uptake of the knowledge they have gained during their own studies through conference presentations and involving the students in project work. Interviewees were therefore asked how they selected their supervisors. There were three groups of PhD students:

- PhD students who studied abroad;
- PhD students who studied abroad but in projects; and
- PhD students who studied in Ghana.

#### – PhD students who studied abroad

Jan who studied for his PhD in Germany mentioned:

Normally the studies there in Germany is designed such that you have to look for your own supervisors (P3, 7:17).

For Piet, on the other hand, the selection of supervisors at doctoral level in the department where he pursued his studies, was done by a coordinator. Piet's PhD studies were followed in a programme implemented at the University of Ghana:

The topics they teach. Then we had the coordinator. We went and asked him, who do you think can handle this topic? Then he will mention several names and write them out for you. So you just google a bit and see who is more appropriate then you go. So that was a good selection method. Ahaa wait, there was another thing. Professors also had the opportunity to choose. So there was one Professor A. He saw the topic and chose it then called me (P6, 4:16).

Danie, Zea, Ruan, Zonja, Nico and Harrie all obtained their degrees abroad (the Netherlands, Germany, United Kingdom and South Africa). Their selection of supervisors for their doctoral studies differed in all cases, even for three of the above interviews who obtained their PhDs from one universities in Germany. None of these interviewees undertook their PhD in a specified project. They either funded their studies themselves or obtained a scholarship, which did not look for supervisors for them.

Danie:

I think at that time, I submitted a topic to him and he agreed to supervise. Normally, I was supposed to get the second and third supervisors but for the second and third, he also did. He asked me whether I was willing to allow him look for other supervisors for me and I said yes. Even though in the long run, it turned out to be somehow to be a bad decision. It affected me

in a way because one of the co-supervisor apparently happened not to have any idea to the work. It was a problem, he asked me to change a lot thing in the content of my thesis (P11, 15:66).

Zea:

Well with Professor G ... he was my master's supervisor so I just wanted him to be one of my supervisors. You know they did more of engineering and natural science stuffs so that was the only chair that look at social issues in environmental science so I went to that chair and the professor there had done some work in the field I wanted to undertake my research. Similar to what I was doing (P12, 5:61).

Ruan:

when I had my concept notes, I discussed it with a colleague and a colleague told me, "ooh I know a particular professor who is interested in this idea. Because normally when you want a PhD, it begins with having a supervisor who is interested in your work. So I started with longing for a supervisor on the Internet and later a recommendation from my colleague at CSIR. From the Net and from some of mine colleagues (P13, 6:14).

Zonja:

Well from the Internet, there was on the Sterling website, the Institute for Aquaculture website, they had a contact person. So I contacted that person and indicated what I wanted to do. And then he proposed two people. Like oh then discuss with a professor and the other one had a PhD. So I thought the professor will be more experienced, so I opted for the professor (P15, 3:19).

Nico:

Once you have a PhD interest, you need to talk to somebody who is a professor or somebody who has authority in the area, you talk to the person first. If he or she will be willing to supervise you before even, you start your PhD work. You need to first engage the person even if you are outside Germany, it's a matter of correspondence. Write to the person, send a mail, talk to the person, find out if the person is willing to take you up, granted that you have the requisite qualification (P20, 3:13).

Harrie:

one of our colleagues went for a conference in South Africa and then he met the supervisor. I think they had a chat and talked about it so when he came here he encouraged me that he met somebody who was in the field and encouraged me to talk to him so I wrote him and he decided to give me a topic to write and then he evaluated it so when I sent the paper to him he looked at it and he was quiet impressed with it so that is how it all started (P1, 7:18).

For the selection of supervisors, interviewees who undertook their PhDs abroad had to resort to the Internet, colleagues or personal contact with the supervisors in order to settle on a supervisor for their doctoral studies. There was no proper procedure for the selection of supervisors for the students. This was similar to the method used by interviewees who

undertook their PhD studies in Ghana. Students had to read about the recommended supervisors and then had to contact them with regard to their research area. The supervisor had the chance to select the type of student. Generally, students who undertake their PhD studies as part of a project have a selected set of supervisors to select from as mentioned by interviewees from ZEF and UNESCO-IHE.

- **PhD students who studied abroad under projects**

Gert, who studied under a UNESCO\_IHE programme in the Netherlands, had to search for his supervisors through the Institute's website:

What I did was to google wastewater treatment as far as Netherlands schools are concerned. I came up with I think three schools and then I searched critically I came up with two schools. Later I realised these two schools actually have a joint programme so I looked at their website and then looked at the lecturers and their areas of interest and research and based on that I contacted them (P7, 6:24).

Lenny, just like Gert, obtained his PhD from the same institution in the Netherlands also under the UNESCO-IHE programme. He noted:

I think mine was a bit structured in different areas, so if you are into drinking water treatment, there is a group and the group has a professor you select from. My thesis was more a bit of management institution and not very technical, so it was the head of the group. Actually I started with a British, with the finances. We started working and he left the place, so I had to look for a new supervisor and at that time I got a new professor (P8, 5:19).

Nigel who also obtained his PhD from the same institute as Gert and Lenny, mentioned:

For my PhD, it was the supervisors who were determined before I even started. But they had two professors for water resource management. So they were determined before we started (P21, 10:27).

Although Nigel, Gert and Lenny obtained their PhDs from the same university within the same period, selecting their supervisors was determined by the ways they entered the institution. Gert had to look out for his supervisor while Lenny and Nigel were nominated by the institution and therefore had the supervisors selected by the university before they arrived for their PhD studies.

David and Willem both obtained their PhDs from the same department of a university in Germany at different periods. Willem obtained his in 2008 and David his in 2012.

David:

in ZEF, I just picked him based on a brief review I did about him, seeing what he's done over the years, his achievements and his contributions and all that. I really wanted to learn under someone like that, someone who'd eventually have that kind of impact that I would be able to leverage on but without which I would not be able to have actually gained anything like that. I really wanted to leverage on what the professor had done so far in his field that's how come I chose him (P17, 4:14).

Willem:

supervisor was suggested for me by the director (P2, 9,15).

For both Willem and David, the selection of supervisor was not any different although it was in the same institution but at different times. When Willem started his PhD, the project under which they were being trained was very new and therefore required that the director of the programme made specific recommendations to the students about whom they thought was in the best position to supervise them. When David enrolled for his PhD programme, the project was coming to an end and they allowed students to look for supervisors who had supervised others who had graduated on the programme.

- **PhD students who studied in Ghana**

Kai, Ben, Anje, Jan, Luan and Janco all obtained their PhDs from Ghanaian universities within the same period (2009 to 2013). However, selection methods for finding supervisors were slightly different. Students either had to go and talk to a supervisor who they themselves deemed qualified to supervise them for a doctorate degree or they had to rely on previous students to make recommendations in terms of supervisors to them. They then had to show their proposal to the supervisors and wait for their feedback to hear whether the supervisor was willing to supervise them.

Anje:

I met Dr A. He was with the Department of Environmental Science. he was with lecturing the environmental science students so I shared with him my proposal and I said this I want to work on. Do you mind supervising me? He read it and he said I should come back again and see him. So I went back and he said you know what? I'm going to hold your hand like this and I will send you to the person who can supervise you. Really and he said yes and he took me to Professor OY and he said this is the man who can supervise you. So I'm handing you over to him. So that's how come I got a supervisor. He became my principal supervisor and Professor A became the co-supervisor (P16, 4:19).

Kai:

After my MSc at KNUST, Professor O who supervised my MSc in seed science, encouraged me to undertake a PhD programme. She was also a factor in my continuation for a PhD work.

She was a good supervisor. So I had a one-to-one relationship with her. Apart from that she was the only seed scientist in the whole university. Then I needed at least one other supervisor and I had one at Seed Lab in Scotland. Dr Sakandi who was also an expert in seed science (P18, 8:25).

Ben:

My supervisors actually [...] one, my supervisor happened to partner with me on this collaborative work. It was a global environment facility project funded by FAO, hosted at University of Cape Coast (UCC). So we were partners. So we were meeting and I got to know that even though he's a wildlife man he was also interested in pollination. That become the first consideration. And again, I was also teaching part of his course so there was a link. A bound sort of. And the second thing is that my former ... somebody, I wanted somebody who would at least have an idea about pollination. My former lecturer who actually supervised my MPhil, Professor YG, at that was on retirement and was so old (P19, 7:47).

In the case of Jan, it was the faculty which selected the supervisors for him. In Anje's case, it was a recommendation from his superior at the work place. Kai continued with his supervisor for his master's degree with whom he had established a very good relationship over the years. Luan was limited in his choice of a supervisor because the department where he undertook his PhD had just one professor who was also in charge of all PhD students.

Although the interviewees above obtained their PhDs from just two selected Ghanaian universities, it seems the universities did not have a clear procedure for students to select their choice of supervisors. As Cloete *et al.* (2015) note, one of the major challenges to doctoral research in African universities is the availability of supervisors. This concern has been expressed by the interviewees also, especially Luan.

Overall, the selection of supervisors for the interviewees was affected by three major factors: location of study, source of funding for the study (that is if one was on a scholarship), and whether the student was undertaking the PhD studies on a project. Interviewees who did their PhDs abroad and in Ghana but not under any project had to find supervisors themselves since there was no established structure for them in this regard. In addition, students who studied abroad on scholarships (mainly from their governments or under commonwealth or DAAD, the German Academic Exchange Service) had to look for supervisors for themselves. Interviewees who undertook their PhDs on specific projects like the ZEF and UNESCO-IHE had selected supervisors recommended to them. It is reported that students who had supervisors recommended to them under a project, maintained very good relationships and collaborated with the supervisors' years after they had graduated, and that relationship helped

in the uptake of their thesis findings.

## **5.5 Contribution of PhD research to the already existing body of knowledge**

At all times, the outcome of doctoral research should add new knowledge to the already existing body of knowledge. The theses produced by the interviewees reported major findings in the field and made recommendations to policy and practice in the field. In a later section, interviewees' answers, when asked whether their findings and recommendations made in their thesis were still relevant even 5–10 years after completing their PhDs, are reflected. If the outcomes were still relevant then there was a need for uptake of the findings and recommendations by the university, the interviewee or the sponsors of the thesis.

### **5.5.1 Relevance of the key findings and recommendations from PhDs**

All 20 interviewees were asked whether their findings from their thesis were still relevant. They all gave positive responses to that question. They believed that their findings and the suggestions made in their recommendations were still relevant.

Harrie:

I believe the issues I raised in my thesis are very relevant today and also relevant to Ghana (P1, 28:73).

Samuel:

The issues raised in the thesis and findings are still relevant because WV Ghana has a drilling operations department (P5, 25:108).

Piet

The recommendations are still very, very relevant (P6, 29:73).

Luan:

The issues are still very important. Especially with the fishing pressure. Because once a while you hear that, you know, once there is a waterbody, the fishermen especially the migrant fishermen, they will always move to where there are fishes (P10, 1:85).

Zea:

They are still important because we are still writing about it, we are still making the same recommendations. I keep seeing this in many forms, for example the two that you mentioned. We have a project right now ASSA and we are doing similar project in line with my PhD thesis (P12, 19:128).

Jan:

I think they are, some of them are extremely relevant and I have already seen some of mine predictions you know taking place (P14, 24:83).

Zonja:

The issues I raised are still very relevant in the field. One of the issues that I talked about ... I think the financial viability part was the price of the fish, whether it can be sustained. And the reason was that with a lot of fishes being produced, the price is likely to drop. And what is the minimum price that a farmer can sell fish and still be profitable? Currently as we speak, that is a problem now. People are getting out of business because they produce the fish and they are not able to meet the cost. Because we have the issue of these large farms ... well because of economies of scale can produce at a cheaper cost and then are able to sell it relatively cheaper than what the small scale producers are doing. So that issue is currently something that needs to be looked at and how it can be dealt with I am not yet sure. But then a lot of small scale producers are now out of business because of the price of fish (P15, 28:114).

Anje:

I think the issues are still very relevant because at the end of the day we're looking at sustainability right, since I finished my thesis, I have not gone back again to see the community (P16, 22:81).

Kai:

They are still relevant because the issues have not been resolved. People have not taken it up and the issue of pollination is still on the low side. Notwithstanding, even the FAO-sponsored project where a lot of noise was made. There were stakeholder's meetings. We had one in Kumasi here, we had another in British Council. I mean British Council I think we had about two or so. National stakeholders meeting. I suppose the economy of the nation too is a factor. People are thinking about ... (P19, 22:148).

Nigel:

Very much. You know I even have two papers to bring out of my thesis. Just that some of my data have to be updated. I'm writing one paper I've drafted it several times on government funded large irrigation schemes as against small scale irrigation system, which is the most sustainable. And I'm still very strong with the opinion that it should be the small scale. Because we still have a lot of government funded irrigation schemes which have just run down our cash. We have nothing for it. Nothing to show. So I'm still very strong with my outcome of my thesis. Because I realised they the up-scaling of irrigation in the white Volta is mainly by private farmers and it is because they have farms sizes that are within their managing levels. And it saves the government money (P21, 22:65).

During the interviews, all interviewees maintained that their findings and recommendations were still relevant. However, the findings have not been utilised well.

## 5.6 Major challenges/bottlenecks during PhD studies

This section presents selected challenges and bottlenecks, which the interviewees experienced during their PhD studies. The section begins by presenting the study type and the type of funding they had to undertake PhD studies. The duration of their studies is also discussed and, finally, the bottlenecks they experienced during their study are reflected.

### 5.6.1 Funding and study type of PhD

Funding source has a direct influence on the duration of working on doctoral studies. In addition, the source of funding helps the uptake of the findings and recommendations of the thesis. The funding sources also affect the type of study. The DAAD scholarship gives their beneficiaries opportunities to present parts of their research during and after their PhD studies at conference and workshops. In most cases, the DAAD funding also allows students to study full-time. Other scholarships from the Commonwealth also allow students to study full-time. The UNESCO scholarship allow students to study part-time and to visit their campuses periodically during their studies.

Of the twenty interviewees, sixteen had full scholarships for their studies whilst the other four self-funded their studies. Of the four who self-funded their studies, three had some field support since they collected their data under a project their offices were implementing. Selected responses from the interviewees on how scholarships were obtained are presented below:

Jan:

It was a DAAD scholarship but runs through this centre, IWMI and many of the people doing the natural science were on that project from that centre and they use to come to the basin a lot so he introduced me to them. We meet we discuss and then after my interest in the programme and they say yea your interest fits in what we are doing so why don't you apply so then, I applied for admission there including the scholarship. And once I got admitted, it came automatically with the scholarship (P3, 5:7).

Willem:

the funding was from DMDF – the ministry of education and research in Germany. Once you were accepted by ZEF, you automatically qualify for the scholarship (P2, 13:33).

Jan and Willem obtained scholarships from the German government but from different institutions within the government. Once one had admission into the GLOWA Volta programme, you automatically obtained a scholarship. This scholarship also gave Willem and Jan opportunity to present their findings at selected stakeholder meetings in Burkina Faso and



Ghana since the project research was undertaken in those two countries.

Lenny:

What happened was, I was nominated, so I did my master's there actually as staff development programme for a PhD outside Ghana. So I was made to apply (P8, 35:10).

Lenny and Nigel both obtained their scholarships under a staff development programme at their institutions. Their studies were fully funded but the scholarship did not give them the opportunity to present at conferences, seminars and workshops their findings during and after PhD.

However, Gert who also studied at the same university as Lenny and Nigel had a different scholarship. His scholarship also funded fully the cost of his doctoral research and gave him the opportunity to present at conferences, seminars and workshops his findings during the period of his studies.

Interviewees who undertook their doctoral studies in Ghana had different forms of funding for their doctoral education. All interviewees who studied for their PhD at Ghanaian universities obtained scholarships after they had started with their PhD programme. At the time of admission, none of them had financial support for their studies.

The above confirms that most students who undertake doctoral education in Ghana do so after they had failed to secure doctoral admission with full funding from universities abroad. Most students undertake their PhD in Ghana as a last resort. The sources of funding for interviewees who did their PhD in Ghana varied.

Janco:

My PhD was funded by TLIF, Teaching and Learning Innovation Fund. The scholarship was a World Bank project which came in just the time. I was doing my PhD. So when it came in I applied for support. They supported for me to go the US (Cornell University) to develop the PhD research proposal and also purchase some field equipment. When I came back, the University's Research and Conference Grant supported me to collect my data and do my analysis (P9, 5:20).

Janco's scholarship initially supported him to travel abroad to work with other professors to develop his proposal and to pursue some equipment for his field and laboratory work in Ghana. The fund did not support him to present at conferences, seminars and workshops his findings or publish the findings of his thesis.

Luan obtained funding for his studies from the Ghana Education Trust Fund (GetFund<sup>10</sup>):

My PhD was funded from Getfund, The Ghana Education Trust Fund (P10, 6:13).

The fund supported mostly the cost of tuition and field research. It did not fund the cost to conferences or workshops to assist with the uptake of their findings.

At the time Anje enrolled to start her PhD programme in Ghana, there was an initiative by the then vice-chancellor to train young PhD graduates to fill the gap that was created as the old generation of academic staff at the university retired. The initiative was also launched in an attempt to stop the best undergraduates from travelling abroad for postgraduate studies.

Anje:

apparently you know we were on the VC special initiative. we were entitled to research allowance. Which at that time it was 500 Ghana cedi a year and a month some stipend and that was also not forthcoming. One thing, Prof. OD told me when I went there with my research proposal was like ok you have written your proposal. Alright, so let's try and get funding so I started looking around, looking around for any advert call of proposal, call for proposal and then I found one it was by Canadian International Development Agency (CIDA). So why don't you apply for funding you know it will help and at that time I was naïve. I was like this man what the hark is his problem. I have VC funding 500 cedis a year, you know, that's a lot of money so why is he worrying me I mean I still put in the proposal, I submitted it. I was lucky I got some money (P6, 6:23).

Anje's supervisors also recommended some other sources of funding for her, for which she applied and obtained.

Kai obtained two scholarships for his PhD studies. The Commonwealth scholarship allowed him to travel to the United Kingdom to undertake his laboratory experiments whilst the Getfund supported his tuition and other fieldwork in Ghana:

Kai:

Let's say maybe from Ghana government (under the GetFund) as well as the Commonwealth fellowship (P18, 5:19).

Thys was working on a project when he enrolled for a PhD programme, so he captured the data he thought he would need for his doctoral research.

Thys:

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<sup>10</sup> The Ghana Education Trust Fund (GETFund) is a public trust set up by an Act of Parliament in the year 2000. Its core mandate is to provide funding to supplement government effort for the provision of educational infrastructure and facilities within the public sector from the pre-tertiary to the tertiary level.

I will say myself except the fieldwork I wrote project proposal to US Fish and Wildlife Service, I never said I was using it for my PhD. It was a normal proposal and they were willing to give me the money for the proposal (P14, 12:36).

Interviewees who studied abroad not under a specific programme obtained their scholarships by applying to institutions of funding for support. Except Nico, who funded himself during his doctoral studies, all the other interviewees applied and obtained scholarships for their studies:

Danie:

I had a scholarship to pursue a master's in the same university and after my supervisor promised me availability of funds to continue with the PhD if I wished to. So I did apply and got the scholarship (P11, 2:5).

Zea:

it was just some partial funding so later I met somebody from DAAD. I talked to him and he told me that the deadline for that year had passed but I should put it in for the next year which I did (P12, 2:29).

Ruan:

NUFFIC, Netherlands fellowship programme. Actually, initially when I went I got a Wageningen university sandwich but that Wageningen sandwich PhD only gave you 18 months of funding in the Netherlands and no money for research and the arrangement is that your country, your home institution, will fund your research but the NUFFIC gives full funding for both research and your time in the Netherlands. So one year after the start of my PhD, I applied for the NUFFIC and I got the NUFFIC. I gave up the, the first fellowship after using 6 months of that fellowship.

Zonja:

It was the commonwealth scholarship. It was advertised in the newspaper, and I applied for it. A number of interviews and short listing and finally I was among the few that were selected (P15, 2:9).

Harrie:

there is a programme at the South African university I studied, which my supervisor was in charge. So I think he used that programme. It's a Dutch, a South African Dutch programme, Flemish programme and they funded it, they funded the research (P1, 13:32).

As mentioned earlier in this section, Nico self-funded his PhD studies:

At a point I had to sponsor myself. So sometimes I leave campus for some time, holidays I leave campus to work a bit, come back. Although I was also involved in a bit of but not the full-time teaching assistant work. Just limited assistance (P20, 6:23).

From the data, it seemed that the source of funding for PhD studies might in some ways affect the uptake of the research findings and recommendations. Scholarships under the ZEF project

encouraged students to present their findings during and after their PhD studies at conferences, seminars and workshops and also publish with their supervisors.

### 5.6.2 PhD study type and duration of study

Interviewees were asked whether they studied full-time<sup>11</sup> or part-time.<sup>12</sup> The study found that the type of study has an effect on the duration of a student's studies i.e. the longer it takes students to complete their thesis work and graduate, the more they feel the data generated is old and therefore does not necessarily ensure the uptake of their findings.

Of the twenty interviewees, twelve studied full-time whilst eight did their studies on a part-time basis. All interviewees from UNESCO-IHE studied part-time (went to the Netherlands periodically). All interviewees who studied abroad as well as those from ZEF studied full-time. All eight interviewees who did their education in Ghana did it on a part-time basis except three of them: Piet, Anje and Luan.

Overall, the study type (full-time or part-time) and the form of scholarship has an effect on the duration the student spends completing the programme. Fully funded doctoral studies under a project stand a better chance of students completing their studies on time. This can be due to several factors, including the fact that students under such projects have good supervision and access to facilities to help them finish on time. In addition, students are expected to finish their thesis during the timeframe of the project and in most cases, the best students with an interest to carry out a PhD, are recruited for the doctoral studies.

Interviewees who went to ZEF under the GLOWA Volta Project spent a maximum of three years to complete their PhD studies. Interviewees who had full scholarship but who did not study under any project, spent four to nine years on their studies. Interviewees who self-funded their doctoral studies in Ghana spent a minimum of six years and a maximum of 10 years on their studies. Most of these candidates collected their data in the first year of their studies. The data then became too old for them to publish it in any journal with a high impact factor. It is also clear that if a student spends a long time completing his or her studies, such student will be seeking employment whilst waiting to graduate – if he or she is not already employed. If the student finds him- or herself in a different professional field, not linked to his or her doctoral

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<sup>11</sup> **Full-time** means the interviewee was resident at the university during the entire duration of the course.

<sup>12</sup> **Part-time** means the interviewee travelled periodically to the university or was not on study leave during the studies.

studies, the study showed there will be no uptake or utilisation of what was studied at PhD level.

As discussed above, the duration of PhD studies, the form of scholarship and the study type affect the uptake of the findings in the immediate and long term. As African universities maintain their mission of training more PhDs, the issue of duration of PhD has been addressed by most institutions (Ameho, 2013). In 2008, the University of Ghana addressed the issue of duration of postgraduate studies. This led to an increase in the number of master's graduates since then. However, the problem has not been addressed fully at doctoral level, although efforts are being made (Ameho, 2013).

### **5.6.3 Major bottlenecks during PhD**

Interviewees were asked what they considered the major challenges they encountered during their PhD studies. These bottlenecks have an influence on the outcome and outputs of the research produced at the end of students' studies and by extension the utilisation of the findings and recommendations of the thesis.

Willem studied under a full scholarship and under a project:

Funds, especially for data collection. The funds were quite problematic. In this sense, we were giving limited money so you can't collect wide range of data I had to insist, that they gave me money to do that. So that was one of the major bottlenecks for data collection though GLOWA had a lot of money for some of these things, but things were not well coordinated at that time (P2, 74:224)

Although funding was his major challenge, the lack of funds was due to the poor coordination of the postgraduate component of the project. The research required him to travel to Ghana from Germany for the field data collection in Ghana and Burkina Faso. The analysis of the data also needed a software program that was expensive.

Jan who studied under one project as Nigel had a lack of long-term data as major problem during his PhD studies:

I think availability of long-term data and it's still the challenge because most of the works we do we need long-term data for your analysis to understand the trends within certain fields or areas that you want to understand. So not having sufficient long-term data that are of good quality because many of our data has a lot of gaps in them and that means that you have to fill those gaps by estimating for them which also has implications on the outputs that you get. So I think the major challenge is how to get access to long term data that are of good quality for analysis (P3, 50:99).

Eight years after completing his doctoral studies, Jan believed that access to long-term data is still a problem for research in the field. Other interviewees who studied under projects pointed to the lack of coordination and access to long-term data as their major challenges.

Samuel who self-funded his studies at a Ghanaian university, mentioned supervision as his major problem:

it was more of supervision because the three supervisors were in three separate locations. One abroad and all that. Their inability, all of them, meeting and deciding on your work (P5, 33:127).

Funding was not a challenge for him because he was heading a unit at his organisation and had staff and interns helping him with fieldwork and analysis.

Similarly, Harrie and Danie named supervision as their major challenges:

Harrie:

My supervisor is a helpful guy but he is also a very difficult person in the sense that he doesn't engage you as much as you'd want to (P1, 57:157).

Danie:

The supervision. There was one supervisor who was proving very difficult (P11, 47:253).

Piet who was fully funded under a project at one of the Ghanaian universities alluded to fear of the unknown, namely when he was going finish his PhD as the major bottleneck:

bottlenecks, the first thing is that you are afraid. Can I finish this? Then you start writing slowly, reading slowly, you write it out, you present it to your supervisor, before you present you are afraid. What will they say about this? You know the Ghanaian stuff. My friend, you are not serious. What is this? Once it happens to you, the next time you are afraid to present the stuff. So the question is, can you have supervisors that can understand students who often go further than the time they should be there? And are they ready to come back with the students to complete? So how dynamic or how flexible can be such a supervisory role? In Ghana, almost all the time is official meeting. So how does the student get to let out some of his frustration? You know. The atmosphere is not the best (P6, 51:141).

Piet had good supervisors and funds to complete his work and even travelled to the Netherlands to spend some time at a selected university to use their facilities. However, the long duration of other candidates' doctoral studies produced fear in him of not being sure whether he was going to finish his own PhD on time.

Janco had support from a project at his university:

at a point in time it was funding but once I had this Texas Interscholastic League Foundation (TILF) funding it ease a lot of things. Other thing is that our lab facilities here were not the best. There a times certain results you will begin to ask is right, is it ok so I think facilities so I had to do most of my analysis at soil research institute. To be honest though I had supervisors here but I really didn't have supervisors, it was self-supervising. Cornell lecturers were very helpful from the day I got there, developing my proposals when I came but they were following up. But for my own people to be very honest it wasn't the best I mean I never had a supervisor. He was here in May but nothing, when you meet him he will say do this do that and it's because you've met him but beyond that there was nothing so I virtually self-supervised (P9, 34:119).

Although his initial problem was with funding, Janco later had institutional support, which eased that burden. However, he had other bottlenecks, which delayed the completion of his studies, such as his supervisors who were not reachable when he needed them. In addition, a lack of adequate laboratory equipment for analysis was also a major challenge for him. He had to rely on the CSIR laboratories for his work and also had to self-supervise for most of the work. This delayed the completion of the work and also affected the uptake of his findings. He did not see it as relevant publishing his findings after his PhD studies He did not publish with his supervisors after completing his studies.

Luan, who also studied at a Ghanaian university, just like Janco, had an initial bottleneck of funding but later received a scholarship:

In the initial stages there wasn't funding initially. I started before a colleague whispered into my ear I should try Getfund. Which I sent the proposal along the line they supported the study. So initially, that was the thing. And also distance to the research station was a challenge. If you are at Legon and you want to come to Bui and even if you come to Tamale and you still want to go when you take the transport alone. So funding is the major challenge. The risk of transport. There is armed robbery on the way so. And the waterbody also. And then later supervision. My supervisors were not mostly available and their contribution was not that much. Access to literature was also a big issue also. Most of the articles are locked on the website and if your library doesn't have adequate books and online resources it becomes a problem (P10, 59:178).

Luan also had other bottlenecks. Access to literature for his work was a problem. He also did not get enough contributions for his work from his supervisors. However, he maintained the relationship with his supervisors after completion of his studies.

Jan's supervisors and his department did not cooperate at the start of his studies. It was only after two years that he presented his research proposal and the faculty members recommended he narrowed the scope of his work. By then, he had collected his field data:

I will say that usually and from my experience with mine, it's the cash for the fieldwork. One of my issues was that two years after collecting the data when I had all the professors come to sit to listen to mine Project proposal that is one of the key things that came out was that s your geographical area is too big. At that stage, much later, supervision was okay. I realised that if that meeting had gone on earlier, I would have you know and it would have been much easier for me (P14, 47:166).

Jan obtained his PhD from a Ghanaian university and also funded his studies under a project his office was implementing in his research study area.

Gert studied in the Netherlands with a Commonwealth scholarship:

am supposed to be working in a research institution and therefore was supposed to have had certain basic equipment to work with. They were virtually non-existent. Yes, I was communicating with my supervisors via email. And in fact it is one of the reasons why my PhD also delayed. The reason is that when you send something to them, because it is by email and they are doing other things, it takes a while before they get back to you and until they get back to you on that particular aspect you are not moving (P7, 54:234).

He conducted his field and laboratory work in Ghana at the CSIR. The lack of equipment for his work and the virtual communication with his supervisors were the major challenges he encountered during his studies. This delayed his work.

Lenny, who was nominated by his institution to undertake his PhD outside Ghana at the same institution as Gert, thinks he did not really have any challenge:

I think it was fairly okay, but you know it was sandwich, you go there you do some work then you come Ghana, but you know when you come to Ghana that there a lot of distractions mostly social issues' P8: 51,249

The little challenge for him, since he was studying part-time, was that he could not focus fully on his work when he was back home. There were many social issues which took his attention from his work.

Ruan had a bad experience with her fieldwork in Ghana She studied in the Netherlands but conducted her fieldwork in Ghana. She said:

for me, right from the word go, the fieldwork was super terrible because it was really very



intensive and a lot. I worked on 23 indigenous species. Then I did a lot of concurrent measurement and some of the measurements that I had to do I did not have the equipment in my lab in Ghana and even in my institution. So initially, when I came back I tried to get to CRIG, Cocoa Research Institute of Ghana to get an equipment there to use. You know I got it but then it did not really work very effectively. The other major equipment that I got, I brought it from Wageningen University and then the one that I got from CRIG. When it broke down, luckily when I was in the conference in South Korea, there was an exhibition and I saw a very simple one made by a USA company and then I was able to get that. I really like convinced my institute to buy it and they bought it. So that really saved that aspect. So one of the major challenges had to do with the equipment. Equipment was really the major challenge. The second one had to, for me, I faced was a vehicle to go to the field. Because I like in the field, I worked in two forest reserves in two regions (P13, 43:162).

She felt the number of samples she worked with was too big and it was tiring for her. Access to adequate equipment for her laboratory analysis was also a big challenge to her. She had to rely on other institutions outside of her research institute for her laboratory work. Generally, Ruan identified logistical challenges as the bottlenecks encountered during her study. She was on full scholarship and the challenges she encountered – just like those of Willem and Jan who were also on full scholarship – prove that scholarships do not really cover fieldwork fully if data should be collected from another country than the country of study.

Zonja studied with a full scholarship in the United Kingdom and collected her data in Ghana. Her major challenge during her PhD study was taking care of her family while at the same time paying attention to her studies. She related:

I think they were more of personal things because, well, I have a family and right from the start I told my husband if I am going then we are all going together. So I had the children to take care of and then the schooling to do. So it wasn't an easy combination but then I managed to ... I had to work it out. It was such that ... of course in Europe, my husband was working. He was working a full-time job while we were there. So most of the time I had to ... and the children were young so I had to be able to combine that effectively. It wasn't an easy job but then ... Most of the day I had to be with them. I don't even know about the UK system, for children less than five years they go to school just two hours a day. So I had to manage. That time they were just two and I was pregnant with the third one. So the two hours that is out I will go to the department to do whatever I had to do, when he's back home I will stay home and then when my husband close and back from work, and he is usually home around 6 pm, he will stay with them and then I go to the department around 9 pm, stay up to 4 am working and come back in the morning. It wasn't an easy thing. But I will also say that the facilities make things easy for me because even when I'm home, I can access a lot of resources from the university and then be able to work. In fact, I made sure I was always taking the university accommodation, so I

was always on campus. Most PhD students stayed out of campus but I preferred knowing the limitations and challenges, I stayed on campus (P15, 55:238).

Ben, who self-funded his studies and who had to seek extension for his studies several times, summed up his challenges in a few words:

Finance, literature, logistics. I think these are the three main things (P19, 38:247).

There were rare cases where interviewees did not experience any problems. For example, Kai who obtained his PhD from a Ghanaian university did not have any bottlenecks during his studies. He mentioned he had a good relationship with his supervisors and also completed all his analyses in the United Kingdom before travelling back to Ghana. His case was an exception.

However, overall, adequate funding was the main challenge for more than half of the interviewees. Even for those who had full scholarship, their fieldwork in Ghana was not adequately funded. This delayed the completion of their work and also the quality of data. Generally, except for two of the interviewees who obtained their PhDs in Ghana, supervision was a major problem. Those who undertook their PhDs in Ghana and those who communicated with their supervisors virtually mentioned these as problematic. For those who did research in physical sciences, access to long-term data for their research was a major bottleneck during their studies. Interviewees who studied abroad but had to do their laboratory analysis in Ghana also experienced the challenge of getting adequate equipment from the CSIR and access to their institutions' laboratories. A lack of coordination by sponsors for those on projects was a problem identified by those who studied under projects.

### **5.7 Overall value of PhD studies**

Interviewees were asked about the overall value of their PhD to them. This had to help the researcher to understand whether uptake of their findings and recommendations were of any valuable to them. Doctoral research should generate new knowledge to add to the already existing body of knowledge (Nerad and Heggeland,2008). The present study was undertaken to understand information concerning the value of knowledge generated by interviewees during their PhD studies and other benefits they identified that come with obtaining a PhD. Interviewees' responses on the overall value of obtaining a PhD can be grouped into the following:

- improvement in research/teaching skills;
- social recognition and/or self-actualisation;

- enhancement of professional network; and
- creation of more consultancy opportunities.

### 5.7.1 Improvement in research/teaching skills

To Harrie, who studied in South Africa and worked for the CSIR before and after studies, the experience of knowing how to read more and do good analysis as well as social recognition were some of the values of the PhD:

before PhD, apart from the topic itself, the experience, the training you go through because you tend to read a lot of other people's work, you tend to read a lot around the subject, you tend to understand all the theories and principles before you can even start your real work so once you go through all these experiences it helps you to understand the subject better. Well people tend to you know, once they see this doctor, sometimes it may even have nothing to do with what you're learning but it's a whole different thing, it's a big issue. For me it has been, it's a lot, it gave me a lot of experience.

It gave me a lot of knowledge, because there are basic things that you could easily neglect. Master's you can do things, you don't get pushed up but during that time, I really had time to go back to the basic things in ground water, hydrology ... how water moves and all THAT you really want to understand that at the time to be able to write about those things, so it helped me, especially when you're discussing with colleagues here and then I try to go into some of these things. You realise that those things are still lost to a lot of them. So I think for me it has been a very big experience to me (P1, 45:119).

Willem has been working at the University of Cape Coast since graduating with a PhD almost 10 years ago. Obtaining a PhD has helped him improve on his teaching although findings from his study have not been used and applied fully:

I would give myself ... if you look at it holistically. I will be moderate and give myself 60%. But if you come to specifics, in terms of teaching. It's very high and consultancy has not been too forthcoming and that will be also very low about 60%. You can't quantify the benefits. But to me it's the one that is moving my life (P2, 70:212).

Willem has had a few consultancies come out of obtaining a PhD. To him, obtaining a PhD was what was moving his life: giving him more opportunities.

Samuel obtained his PhD the very year he retired from working with an NGO. He is currently at home and publishing from his thesis. To him, the experiences he went through during his studies and the uniqueness of the outcomes from his research are the overall values to him of doing a PhD:

looking at the experiences I went through, and what has come out, which is so original and

unique  
(P5, 29:121),

Luan graduated with his PhD less than five years before, and at the time of this study, was working in one of the public universities in Ghana as a lecturer. At the time of the study, he had not had more than two consultancies after his PhD, but he believed having a PhD adds value:

yes, even the studies, going through that studies it helps you even your thinking. You see things differently. But going through the PhD especially in Ghana is not easy. Doing most of the work by yourself and then sitting down to learn. Even software that you want to use – nobody is there to assist you. Some of them – it is the manual that you have to sit and go through. It helps you to think broadly and appreciate things differently with the PhD, as I said, whenever you are working you think about promotion. As it is now in our university, without a PhD you cannot move to professorial rank. Without a PhD, you can't be promoted to a senior lecturer. So having the PhD will enable me to move to the next rank (P10, 56:166).

To Luan, having a PhD has shaped his way of thinking about issues. In addition, the experiences he went through doing his research also helped him think broadly and appreciate scientific findings differently. Since Luan worked at a university at the time of this research, he believed having a PhD would help him rise through the ranks quickly to become a professor.

Danie graduated with a PhD almost eight years before the interviews for this study. Since graduation, he has been teaching sustainability in a business-oriented private university. He thinks, overall, having a PhD has helped him in teaching at the university, exposed him to a number of issues in his field, and gave him the opportunity to attend conferences and workshops:

I think it has contributed to developing myself in the academic field and out of that I think I've also been exposed to a number of issues. I've met a number of people through conferences and seminar presentation and in terms of remuneration I think it has also helped (P11, 45:244).

He also attributes the better remuneration he receives from the university to the attainment of his PhD.

Zea obtained her PhD in the United Kingdom and has been working at the CSIR before and after obtaining her PhD. To her, a PhD has helped extend her network (making it more international than before). In addition, she has had a reasonable number of consultancies after her studies and she attributed these to her attainment of a PhD. In addition, she believed attaining a PhD makes travelling abroad easy because the embassies do not expect you to remain in their respective countries:

my PhD helped but I remember I was working before my PhD so my PhD is just one of the things I did but I had that experience already working in a human interaction with the environment including women and gender issues so there were other things that shaped it before my PhD. Before PhD I was working with just one international organisation in Washington but after PhD it's more international especially with German-based organisations, it's easy for them to work with me. Because DAAD gives us opportunity to meet as past beneficiaries. I also belong to Africa group of networks so these are all networks. Sometimes somebody wants something done and then based on who knows you, you are recommended to them. Recently for example there is a colleague who works with Evergreen Growth Initiative. It was started by someone who came back from Cottbus, the University I undertook my PhD and I knew him from Germany and I recommended him. So if there is a project they think first whom do I know somebody like Dr EKN. So the people that you met during you PhD. There are several of the people within my network that I got to know during my PhD study. So right now if something is happening at the German Embassy they can write to me because they have my name in their data base. Even travelling is easier because they know you won't stay there, you've stayed four years and come back what else are you going to do. I think it's more of professional development because I needed it to move forward and also the networks. These are the two main things (P12, 50:271).

However, to Zea, the main two values a PhD has brought to her were the networks she had formed and professional development. She believed having a PhD has given her the platform for all the opportunities she had.

Ruan, who graduated with a PhD less than five years before the interviews for this study from a university in the Netherlands and who worked for the CSIR, attributed the improvement in her research skills to the attainment of a PhD:

I mean for me it has added value in terms of actually how you can do quality research in terms of the scientific basis of what you do. That there's a difference between writing things for developmental purpose and writing things for scientific purposes so it has given me I'll say a very strong theoretical or scientific background. It has also improved my skills and statistics because before I went, I'll say that I was a bit weak in statistical analysis and even the whole thing, even though I learnt basic statistics in school but we knew that it was not really very practical. So improving my use of statistical software and also methods and then exposure also, very much in at least within the cycle of the PhD, I was in three international conferences, getting the exposure, building your network, seeing that other people are being challenged. You go and then you see people are really working in very difficult terrains collecting data and stuff like that. So this is what the PhD is about. It also in a way places you in a position where you can also advise students very well. I've gotten international invitations to do things. For example, like this conference that I attended in South Korea. I was invited to join the team,

international tropical team to go and give a presentation and then also I was asked to chair a session by the global fire monitoring team in Germany (P13, 34:137).

Ruan's scientific writing skills and knowledge in statistics have also improved after obtaining a PhD. Through her PhD studies, she has been invited to several international conferences and has chaired one of the sessions at one of the conferences.

David graduated from ZEF in 2012 and currently works at a public university in Ghana. Obtaining a PhD has helped him to see, analyse and discuss issues differently:

well I grew up in an area where or like a community where like you know you "need to survive to survive", but with it, it actually sharply changed the way I see things, the way I tend to analyse and discuss issues and so it has basically been what has made me. The PhD has also giving me the platform to other areas. When I was in ZEF we had interdisciplinary teams made up from different areas so discussions with some of these team members actually really builds you up compared to if I hadn't actually gone in for the PhD degree at all (P17, 44:210).

Obtaining a PhD has given David an interdisciplinary background and that has helped him work in other areas, including marketing of soil improvement products.

Kai is a research scientist at the CSIR. He obtained his PhD from KNUST almost six years before the interviews were conducted. Obtaining a PhD has improved his research skills and broadened his professional network:

It has broadened my skills and network, especially my attachment with Royal Botanical Garden (RBG), my six months' attachment there. Eventually I had control on seed testing. If I had not taken a PhD, I think things would have been just at the surface. Yes, a lot of ... Now as I said, CSIR if you don't have a PhD, they will not even consider you for employment. So the PhD now ... it gives you a strong footing to progress further. Then even to supervise students from the university. If you don't have a PhD, they will not bring you students. Yes. Like this student I am supervising from KNUST, if I had not had a PhD, I don't think I will ... Yeah. PhD is good ... you need to get it (P18, 44:183).

For Kai, obtaining a PhD has given him job security and additional opportunities of supervising postgraduate students from the university. He attributed all the above opportunities to his attainment of a PhD.

Nico self-funded his PhD studies in Germany. He obtained his PhD exactly 10 years before the present study. Since graduating, he has not worked in his field of PhD but has been a consultant to the government of Ghana on several projects since graduating. He mentions that

having a PhD has helped him in the work on most duties he has been given by the government ministries:

Sometimes they need ... people need to know that you can do or you can undertake, or when given an assignment you can discharge. And PhD actually facilitates. I mean to tell you the truth in our part of the world, if you look at me I look young. But people recognise me wherever I go. Yeah it gives recognition. It paves the way for so many things. People are willing to listen to you because they think you are a doctor; you have a PhD you have something. You see although I might say you might be stupid, people want to listen to you sometimes because you have a PhD. Sometimes it's by ... by design or default you are likely to work in specific areas. For instance, going to the ministry of environment was not an accident. I really wanted to work for the ministry of environment. And the other appointments or being assigned other responsibilities just came. I think once you demonstrate that you are capable of producing results, people will recognise you and will be willing to assign more work to you (P20, 22:89).

To Nico, obtaining a PhD has given him a lot of recognition and has paved ways for him to do many things. It has also improved his ability to do things and to deliver results on the assignments he is given.

### **5.7.2 Enhancement of professional networks**

Jan obtained a PhD from the same university as Willem and was working at the CSIR at the time of this study. To him, the benefits of a PhD started during his studies. He established a network and out of that network, he had gained consultancies and other opportunities:

During the PhD, I needed climate data, scenario data to do my work so I contacted UK meteorological office for that. So by then you had Joseph. He works with UK office. So I contacted UK met office for that by then he was liaison officer for climate model. I've done some training prior to my PhD with JA and the rest at met office in Ghana. So I needed a climate model but I knew at the time so I contacted them directly and so they said JA the liaison officer so he will work with you to get the data. so we worked together to get some data from that but then the model was not finish in terms of its run for Africa. So we had to switch to other data set to the climate downscaling. By then we knew each other sort of work coordinative from there and then he also had link with some other guys at the UK head office and also at Abu Salam place in Italy and some other places. So we had a link with them and then when we started the Africa adaptation programme we needed to now work with these big centres to get some of them to facilitate the training so all of that we were networking. Also, when we travel to Nairobi and the rest to have regional meetings they also facilitate those meetings we were still doing the networking and also with the people coming from different countries are either from the meteorological offices or the water Department or the Agric office so we have the network keep expanding in that regard but also people read the work that we do and through that they recommend you to people for the work. Through all that until now, the two other projects I work with the European guys some of them are people you've worked with before who recommend



you to others. so some will be like we want to put up consultancy to do this work and it had to do with let's say water basin in Ghana, So we will say our colleague here has worked in water basin in Ghana so let's contact him if he can recommend someone so we will Okay this person we have worked with before ... His expertise is here look at his CV. so will see what to do and they will contact you. So I will say I can join the team let's do the proposal together. Obtaining a PhD has contributed immensely to my career. I see them as breaking ground in the number of areas in the area of ground water, recharge in that direction because from that I have had several opportunities (P3, 44:81).

Obtaining a PhD has made Jan an expert in the field and it has been a ground-breaking experience for him. He received additional consultancies in the field, which has given him the opportunity to travel to several countries and helped him create a broad international network.

Janco has not had many consultancies after his PhD but he believed the PhD has added significant value to his career:

Having a PhD has widening my professional network a lot. A lot, the first one for instance someone said, "I read your PhD on Cocoa and in developed a proposal for a project in Côte d'Ivoire. I want to do the same thing to replicate a similar project in Ghana and I think you can help. Are you interested in being a part of the project?" Typically, this is how most of these collaborations come about. Having a PhD has added to my career, it's exposed me. Had a lot of contacts with people wanting to work with me, wanting to find out using my expertise. Like I said I was in Switzerland just recently. There I met this student who said, "we've read your work so you are the one. Can we talk to you? We've done work in Indonesia and it's similar to your work." I think it has added value. It has also given me the platform to work in other areas. (P9, 25:94).

To Janco, having a PhD has given him multiple values. His network has broadened and has given him some exposure. It has also given him the platform to work in other areas, which were slightly different from what he did for his PhD.

### **5.7.3 Social recognition and self-actualisation**

Piet, who obtained his PhD from a Ghanaian university, less than five years before the interview, and who was working as a private consultant after graduating, said the overall value of having a PhD was 'very huge' to him:

People are very happy to see that you are a doctor. And have a doctor working with them. And they simply believe that the fact that you have a PhD means that your knowledge is enhanced, your capabilities are enhanced, you know you can present better results you know. Also it has enhanced my ability to understand issues much better. Of course, I've had the foundations of broadening my mind already from bachelor and master's but the PhD helps you to look deeper further than you could. The value is huge. In the village where I even live, I try to stop people



from calling me doctor but they won't listen. Then people see you as someone very important in the community. They want to consult you on one or two things. You resist where you think can be problematic but they still come so for the community it is very important to have someone they consider with a higher knowing everything. But of course, enhancing my ability to do different things, of course. Do research and go much detail and better perspective from stuff is also very important. So enhancing your knowledge base is very important. PhD offers you such an opportunity. Then of course, when you do improve your writing skills, life becomes a lot easier with research, with writing findings and of course reporting for a workshop and other stuff (P6, 43:116).

To Piet, obtaining a PhD had multiple benefits, including the enhancement of knowledge in the field. It also helped him to think deeply about issues in his area of specialisation and other fields. His ability to do research has also been enhanced, and having a PhD has given him many opportunities and social recognition.

Gert spent almost nine years on his PhD. At the time of this study, he was working at the CSIR and was also teaching part-time at one of the Ghanaian universities. The overall value for him of obtaining a PhD:

first of all, there is self-actualisation. I believe I have acquired knowledge that can contribute immensely in solving problems for society. But for the PhD, I mean who am I? will I be sharing the same platform with people like former vice-chancellor of the university of Ghana and things like that? I mean it's given me a huge platform. It has helped to teach in the university. It has helped me in my research work when it comes to advisory services in terms of consultancy. I will say that in seminars, yes I may make my point across but as to whether people listen and people are going to take it seriously, that one I can't tell (P7, 46:20).

Gert felt fulfilled after obtaining a PhD. He believed he had also acquired relevant knowledge that could help solve problems in society relating to his field. Obtaining a PhD has also given him the opportunity to share the same platform with people with whom he never thought he would share a stage. It has also given him other opportunities such as teaching at the university.

Thys spent almost eight years studying for his PhD. He is a regional manager for one of the government regulatory bodies in his field of study. He could never assess the overall value of a PhD but the only thing he could say was that obtaining a PhD has made him happy although he fell ill (still is) after graduating with his PhD.

I will say no but it's mainly because I got sick. So, this way people will say even though I am sick, with still want to do some consultancy. When people have jobs – oh he is sick don't worry

him. So it means that I'm just dealing with the few contacts I have. I think I'm really yet to assess that. Only I can readily say that I'm just happy. I've done it and then it's a real joy to, you know I am very happy about the Ghana–Côte d'Ivoire project. I hope someone will continue with that (P14, 40:143).

He works for an agency that does not use one's qualification to determine promotion. Before falling ill, his plan was to move to the university to teach after his PhD since he was a part-time lecturer before and during his doctoral studies.

Ben, like other interviewees who took almost a decade to complete their PhDs at Ghanaian universities, mentioned that the overall value of attaining a PhD for him was international recognition:

Okay. In terms of international recognition, I will say that it has really given me international recognition. Because people have read my work and they ... Some of them send me comments directly about their impression about the papers that has gone out. There's a gentleman in Britain. He wrote to me twice informing me though he is not a scientist, the work has really impressed upon him and he really wants someone like that to work with. And then that also gave me an urge in the GEF, Global Environment Facility project. It gave me that urge. Apart from that, I have not had real consultancies even though I am really waiting for some. It is Sarah Arnold in the Natural Resources Institute, who keeps on telling me that if there's any opportunity ... and in fact, she thinks that we must collaborate and work. But with the directorship I'm a little bit happy. Fortunately, after retirement, man can fully do some work (P19, 32:202).

At the time of the study, he had not had many consultancies after graduating and had not done much collaboration on projects since attaining a PhD. But after obtaining a PhD, he was promoted to be a director of one of the research institutes at the university where he was working at the time of the present study. He thought obtaining a PhD could help him find work (get some consultancies) after his retirement from the university in less than five years' time.

#### **5.7.4 Creation of more consultancy opportunities**

To Lenny, obtaining a PhD provided the opportunity and platforms to be active in the sector he specialised in at PhD level:

There is some sought of uptake but the uptake does not happen in a vacuum, that's what we call leap of faith. Simple reason that you have made a recommendation doesn't mean it will be taken. You need some clear mechanisms to influence policy, to embed it in the systems. I completed 2007 almost 10 years now, I have been active in the sector I have a number of presentations in the sector you can see a number of presentations in the sector, if you google my name you will find all that at least in Ghana. I think what we've discussed summarises the

overall value of the PhD to me and that's what I think. For me the good thing is, been able to work in that area to ensure continuity (P8, 29:117).

At the time of the study, Lenny worked at a public university in Ghana and had been a consultant to one of the government regulatory bodies since graduating. The good thing for him about having a PhD was to be able to continue working in the field even after almost 10 years of graduating with a PhD.

Nigel obtained his PhD almost six years before the interview for this study and, at the time of this research, was working at a new public university established less than five years before. He has also worked on a project for one of the government regulatory bodies as a lead consultant. To him, having a PhD has given him the platform to have all the opportunities he had at that stage:

The PhD really trained me to have that platform to have those opportunities. Because when I went for interview at the University of Energy and Natural Resources, I was a water guy and what are you going to do at Department of Energy and Environmental Engineering. Then I told them that look my PhD looked at irrigation and impacts on hydropower. So when you come to the university now that we have more lecturers, I am skewing towards hydropower and water resources. I am very happy with the PhD training I had. One, it gave me a lot of confidence and two, the exposure and I have a wide network friends I can easily fall on. And my students too benefit a lot. Because with my students what I do is that I'm not a library but I can connect them to a lot of people. I know this one has this, I connect you to see him for this data, see him for this assistance, and see her for that. So that is what is helping me. And I'm also able to get funding for my students. I'm not afraid of job security (P21, 39:128).

Having a PhD gave him a lot of confidence and exposed him to wide professional networks on which he could rely to accomplish any professional assignment. In addition, his PhD studies gave him access to a great deal of data from which his students were benefiting. The network has also helped him raise funds for his postgraduate students. To Nico, having a PhD has given him the needed job security.

Zonja graduated with her PhD almost 10 years before the interviews for this study, and she had been working at the CSIR before and after obtaining her PhD. Her PhD research was one of the first in the field in Ghana. To her, obtaining a PhD meant more opportunities:

Before PhD it wasn't that strong. I happened to be part of research team when I started with the water research in the institute of aquatic biology, there was a project the director then was doing which was called the guinea current land marine ecosystem project and the director put me into it. With that we made a few trips to Abidjan and a few other places for meetings. So

that experience was there. But I don't think it gave me much connection as the PhD did. Because a lot of the research proposals that I have, it can only be the lead value for the PhD. So without them I couldn't apply for those funding's. And then also because of the experience and exposure, like the AU, African Union one I told you about. I was just sitting down and they wrote to me. So all those things have come because of having a PhD (P15, 48 209).

In addition, a PhD has broadened Zonja's network base and made her more visible in her field. She has had a number of consultancies with international organisations, including the African Union. She attributed all these opportunities to her obtaining a PhD.

Although, many interviewees recognised the value of attaining a PhD, Anje, who obtained her PhD from a Ghanaian university in 2010 and worked for a government regulatory body at the time of this research, had not had any consultancy since graduating and was working in a very different field from what she had studied during her PhD. To her, the overall value of having a PhD had not been that great:

I think if I had the opportunity, I would have done the same thing but the approach would have been much more different in the sense that what I find a limitation from the research work I did was the fact I was not able to get the recommendations implemented (P16, 51:203).

Anje would still do a PhD given the chance to start over again but the approach to her research will be different. At the time of this research, she could not really see the link between her studies and the work she was doing. In addition, she would have loved to have a PhD in a more specific and specialised field and not the interdisciplinary field within which she undertook her PhD studies.

From the results presented, it is clear those interviewees who undertook their PhDs in Ghana, no matter their professional field after studies, have had few opportunities in terms of being involved in consultancies and other international conferences. Those who studied abroad have secured employment at the two main public flagship universities and research institutions and they were involved in a fair number of consultancies and international conferences. The above has helped in the uptake of their research findings.

The overall value of acquiring a PhD had little linkage with the reason why most of them undertook a PhD study. Whilst their main reason for undertaking a PhD included to broaden their horizon, to enhance knowledge and to ensure continuity in the field, amongst others, the overall values of having a PhD did not lie for them in producing more knowledge but in the opportunities that came with having a PhD and recognition from the society where they found themselves. The above affects knowledge uptake since PhD holders will not seek to contribute

new knowledge in the field they work but they look for recognition and opportunities, which are not in line with knowledge production.

## **5.8 Summary**

This chapter presented the results of the responses of interviewees and a discussion of the findings of the results on the reasons and motivation for which interviewees undertook PhD studies in the field of ENRS. It emerged that interviewees in the professional field of research and academics undertook doctoral studies predominantly because it had become a job requirement in the institutions that employed them or was to become a requirement in the ensuing years. In addition, interviewees sought to broaden their knowledge in the field but did not mention any contribution to the body of existing knowledge as one of their motivations for undertaking PhD studies. Other respondents in other professional fields, like consultancy, NGO management and government regulatory bodies, mentioned knowledge enhancement and self-actualisation as their motivation for undertaking PhD studies. It is obvious from the discussions that the participants' long-term plans were to join research or academic institutions.

Interviewees who studied on scholarships under a project spent a maximum of four years completing their PhDs and they studied full-time. Although they were on full scholarships, one major problem for them was inadequate funding for fieldwork in their home country, Ghana. Those who studied on scholarships also had a fair level of uptake of their thesis findings through presentation at conferences and workshops and in publications together with their supervisors.

Interviewees who were on full scholarships but not under any project had general problems with supervision, field data collection and analysis. Their funding was not sufficient to cover the full expenditure of data collection in their home country.

Interviewees who had done their PhD studies in Ghana mostly spent almost 10 years but that has since changed after the universities' policy of training more PhDs (see Ameho,2013). They also had a number of problems studying in Ghana, including inadequate funding, poor supervision, delay in completion, a lack of relevant scholarship, and poor uptake of their findings.

## 5.9 Conclusions

From the results presented above, it is obvious that research and academic institutions in Ghana are following the trends in higher education employment worldwide by recruiting candidates with PhDs. The institutions believe this will improve the quality of teaching and research and also the image of their institutions worldwide.

On why interviewees chose to study inside or outside of Ghana: it was clear that the major motivation for studying outside Ghana was the availability of facilities which aided their research and their hope for better supervision. In addition, all interviewees, except one, who did their PhD studies in Ghana, had the intention to study abroad. Interviewees who undertook their PhD studies in Ghana spent longer on their studies than those who went abroad and they mainly attributed the delay in completing their PhDs to a lack of proper supervision and inadequate funding.

For the interviewees, the overall value of a PhD included improvement in research and training skills after attaining a PhD, more consultancy opportunities and enhancement of networks. In addition, one value mostly mentioned in passing was the fulfilment of self-actualisation and societal recognition. The study concludes that interviewees who did their PhDs at Ghanaian universities did not really have many opportunities, even after graduating with a PhD. They have had fewer than two consultancies or none since graduating.

In addition, interviewees' overall value of having a PhD did not lie in producing more knowledge but in the opportunities and recognition by society that came with having a PhD. The above affects knowledge uptake since PhD holders will not seek to contribute new knowledge in the field within which they work but they look for recognition and opportunities which are not in line with knowledge production.

## CHAPTER 6

### ASSESSING THE EXTENT AND NATURE OF PHD RESEARCH UPTAKE

#### 6.1 Introduction

This chapter is devoted to a discussion on the various aspects of the uptake of PhD theses. The chapter begins by presenting the results of direct publications outputs of the theses analysed in the study. It then discusses the citations to these theses, i.e. the number of cites the theses have received after being published, the people who have cited the work and whether the interviewee knew those 'citing authors'. Section 6.2 presents the results of an analysis of the number of conference presentations made by the doctoral candidates and the feedback they received after their presentations. Other outputs (journal articles, books and policy briefs) and their related citations directly linked to the PhD theses are also presented and discussed. We also analyse the types of journals where interviewees published their outputs. The subsequent sections of this chapter present the results and discuss subsequent publications of interviewees after their PhD and whether their subsequent publications are linked to the original PhD studies. The follow up sections present the findings on issues of publishing in predatory journals, monitoring of the interviewees' citations from their publications

In the final part of this section, we discuss the various efforts and strategies made by interviewees to optimize the uptake of recommendations and/or findings from their theses into policy and/or practice are also presented. Finally, interviewees' views on how to maximise research uptake in the field of ENRS.

#### 6.2 Conference presentation of thesis findings and conference feedback

This section reports on the conferences interviewees attended and presented aspects of their thesis during and after their PhD. The number of conferences attended, where the conferences were held and the feedback from participants are presented and discussed below.

##### 6.2.1 Conference presentation of thesis findings

One major form of disseminating findings from PhD research is through presentations at conferences, workshops and/or faculty lectures. The conferences interviewees attended during and after their PhDs, and where they did presentations, directly linked to their PhDs being extracted from their CVs and also from the interviews conducted with them. The results are presented in Table 6.1:

**Table 6.1 Professional background, year of completion of PhD, citations to thesis conference presentations and country of presentations of interviewees' theses**

Name of interviewee	Country	Professional field	Year of obtaining PhD	Number of citations to thesis	Number of Conference Presentations	Countries of Conference
Zea	Germany	Academe	2009	0		-
Ben	Ghana	Academe	2012	0	2	Costa Rica & Germany
Piet	Ghana	Consultant	2013	0	0	-
Thys	Ghana	Government Agency	2010	0	1	South Africa
Samuel	Ghana	NGO	2013	0	1	Uganda
Harrie	South Africa	Research	2010	0	3	Ghana and the Netherlands
Ruan	The Netherlands	Research	2014	0	3	South Africa, Uganda and Burkina Faso
Luan	Ghana	Academe	2014	1	2	Germany and Ghana
kai	Ghana	Research	2009	1	2	Ghana and Burkina Faso
Gert	UNESCO-IHE	Research	2013	1	4	USA, Ghana and the Netherlands
David	ZEF	Academe	2012	2	0	
Danie	Germany	Academe	2010	3	9	China, south Africa, the Netherlands, United Kingdom, Canada, chevron, United States of America and Australia.
Janco	Ghana	Academe	2011	3	1	Ghana
Nigel	UNESCO-IHE	Academe	2011	5	2	Ghana
Nico	Germany	Consultant	2006	5	-	-
Anje	Ghana	Government Agency	2010	9	2	Ghana
Willem	ZEF	Academe	2007	11	1	Kenya
Jan	ZEF	Research	2008	14	-	-
Lenny	UNESCO-IHE	Academe	2007	17	2	The Netherlands
Zonja	UK	Research	2008	25	6	USA, Ghana, Austria, Morocco
			<b>TOTAL CITATION</b>	<b>97</b>	<b>41</b>	



The twenty (20) interviewees were responsible for a total of 41 presentations on thesis findings in fifteen (15) countries (Costa Rica, Germany, the Netherlands, Ghana, South Africa, Uganda, Burkina Faso, the United States of America, China, the United Kingdom, Australia, Austria, Kenya, Morocco and Canada). Most of the presentations were done during the final year or just a year after the PhD studies had been concluded.

Anje, who did her PhD studies at a Ghanaian university, attended the highest number of conferences during her PhD studies (9 in all but presented part of her thesis at only 2 conferences). Her attendance of those conferences during her studies helped shape the final thesis work. Willem also presented his findings six times in four countries during and after his PhD studies. Three (3) interviewees did not have the opportunity to present their findings at any forum during or after their studies. Except for Anje, who had direct outcome from her conference presentations on her thesis citation, the rest of the respondents had little or no linkage between conference presentation and the citation of their theses.

On average, all interviewees were responsible for two presentations of their findings during and after their PhD studies, with most presentations made in Ghana, Germany, South Africa and the Netherlands. The quotations below are again presented verbatim and unedited.

Whilst there is no literature regarding the number of conferences at which a PhD student has to present his/her thesis findings, one of the interviewees noted:

And during my PhD time I didn't really go for many conferences except 1 or 2 in the Netherlands that were more internal to Netherlands not international. So I think for PhD students particularly maybe within the last year they should go for at least 3 conferences (P6, 20:58).

He suggested that PhD students should attend at least three conferences as that will help them to disseminate the findings of their theses. According to his suggestion, most interviewees did not attend the average number of conferences related to their theses. For interviewees who did their PhDs in Ghana, half attended and presented their findings at international conferences in Kenya, the Netherlands, Australia and the United States. The rest presented at local conferences, and in some cases, it was conferences at their own institutions.

Here are a few selected responses from interviewees on whether they presented their findings at any conference.

Janco obtained his PhD from a Ghanaian university and, at the time of this research, was a lecturer in the same faculty at the same university.

Janco said:

in fact, during the PhD itself no, I didn't have the chance to present at any conference, after I didn't really get real chance. I never had a chance to go for a conference anywhere to present my findings (P9, 8:32).

Ruan, who obtained her PhD from a university in the Netherlands, and who was working at a research institution at the time of this research, mentioned:

Because I already its interesting because for us who were at Wageningen, one of the requirements also is that you must do at least 2 international presentations, presentations at 2 international conferences. It's part of the requirement for finishing a PhD. So already I did 2 presentations (P13, 13:64).

Because international conference presentations are a requirement for PhD students, this is the reason some students end up travelling to other countries to present their research findings. That was a motivation for Ruan to present her findings at two conferences in Costa Rica and Germany during her PhD studies.

In a similar vein, Danie, who graduated from a German university under a DAAD scholarship, mentioned:

It was in line with DAAD's policy of presenting your findings to relevant stakeholders you interacted with during your fieldwork. In addition, when I was collecting data, I came down to Ghana with the Forestry Commission. So I also presented to them the findings at the commission too (P11, 8:31).

Danie presented his findings at an international conference in France because it was a part of the conditions of the scholarship he was awarded by DAAD. The presentation was a condition for him to graduate from his university.

However, Anje attended nine conferences during and after her PhD and made presentations related to her thesis. She was working for a government agency on water resources at the time of this research. She said:

Ok so the Earth System Science Partnership Global Environmental Change open science conference which was a global, environmental changes, regional change, health being change global China which was the presentation I did. That had to do with mostly the land use changes and then we also had the African Women in Science programme (P16, 10:40).

Although her university in Ghana did not require her to present her thesis findings as a requirement for graduating, she had opportunities and took advantage of those opportunities to present her findings at international conferences in Australia, Ghana, the United States and the United Kingdom.

Jan, who graduated from ZEF on the GLOWA project, presented his findings at three conferences during and after his studies. The presentations were part of the project.

apart from presenting in defence form, I've presented in two meetings. One was in Burkina and it was within a project; the GLOWA Volta project where we had to present some aspect of our findings. Then when I graduated there was a conference on climate change in developing countries so I presented some aspect of my work (P3: 35, 61).

Since he was funded and undertook his studies under a project from the German government, he was also given an opportunity to present his findings at three different forums, which was a good method to ensure uptake.

Thys has been ill since graduating with his PhD. He has only presented his findings at a local conference:

Not very much. Except that last year or was it last 2 years, there is a big conference celebrating 100 years Forestry Practice in Ghana. So that was the forum I presented two papers out of mine thesis. So far I will say that that's been the formal way of talking about my work (P14, 15:48).

Thys obtained his PhD from a Ghanaian university. Universities in Ghana require PhD students to present their findings at any conference before graduating. At the time of this research, he was working for a government agency and did not require a PhD for promotion. Samuel, who obtained his PhD from a Ghanaian university and self-funded his study, mentioned:

No. it was only one departmental seminar which they invited me to present and then they critiqued it (P5, 8:63).

Just like Janco, who undertook his studies at a Ghanaian university, it was not a requirement for Samuel to present thesis findings before graduating. He also did not study under any scholarship, so he did not have the opportunity to present his thesis at any international conference, during or after his studies.

Generally, interviewees presented the findings of their theses at conferences because it was a requirement of their university or the scholarships they obtained for their studies. Interviewees who studied under a project had the opportunity to present their findings at regular stakeholder meetings and conferences, and that ensured a fair uptake of their findings.

The findings of this study that there are generally few conference presentations by PhD holders is in line with Green, Hutchison and Sra (1992) who assert that only 33% of PhD graduates present their findings at conferences related to their fields.

### **6.2.2 Conference presentation feedback**

After presenting the findings of a thesis at any forum (conferences, workshops or meetings), the feedback that the student receives is a measure of uptake. Interviewees who presented their thesis findings at conferences during and after their studies were asked about the feedback they received after the presentation.

Ruan made two presentations of her thesis findings in Costa Rica and Germany during her studies. She mentioned:

Sometimes when people write, it's these publishing houses that sometimes will write to you (P13, 16:75).

She reported that publishing houses were writing to her to publish the findings of her study with them. These publishing houses may have seen the conference report or announcements and got in touch with her.

David's studies formed part of a project and he made two presentations of his thesis findings in Ghana and Germany during and after his PhD. He said:

no collaboration received with regards to my presentations. Well, I did not receive much but I only had one from KHALIDA, some company that dealt with fertiliser formulation and all that (P17, 10:38).

He did not secure any collaboration from participants at these conferences, but collaborated with a fertiliser company who later took him on as a consultant. His major feedback from his presentation was the collaboration with the fertiliser company.

Nigel who studied at UNESCO-IHE under a scholarship made three presentations of his findings at one international conference. He attributed the good feedback he had from his presentation in Uganda to the participants working in the same field he did for his PhD:

I remember that conference in Uganda. Because then there were people who were related to my field. But in South Africa, NO. Because that presentation, the particular conference was more related to sanitation and the rest and biological treatment of waste. Those were the kind of people that were there. So the interest in my field was not much (P21, 9:25).

The presentation he made in South Africa received poor feedback. He attributed the poor feedback received from the presentation to the focus of the conference and the participants present at the conference. The conference was related to sanitation whilst his thesis focussed on water resources engineering.

Willem presented the findings of his thesis at six international conferences. He received a couple of emails from selected participants after the conferences. Willem said:

Some expressed interest especially on the isotopes studies and also on the work land river flow interaction. So they expressed interest and I have had some couple of emails. About ten emails and also about three or five PhD students have consulted me from the US (P2, 15:39).

He received emails from PhD students from the USA and also ten (10) emails from conference participants. There was good feedback based on his presentations.

Jan presented the findings of his thesis in Ghana and Burkina Faso. He studied on the GLOWA Volta project. He mentioned that after his presentations –

there were people who wanted to do similar work because some of these conferences you have PhD and high top people who will talk to you that they are trying to do similar work, how did you do with this and that and how did you overcome your data challenges and you will discuss with them. Some will send you emails later on and ask you certain questions. Even from the publication I get people sending emails (P3, 36:63).

He had selected participants who discussed with him the opportunity for them to do a PhD in the field since they developed an interest in the work he did for his PhD. He also had emails from participants asking questions about his presentation.

Gert's feedback was a request for his conference presentation. Gert said:

I receive mails from someone. He actually saw a conference paper that I had published, but it was from my PhD thesis and he wanted that conference paper (P7, 11: 54).

In addition, Gert built contacts and received some consultancy work based on the presentations he made based on his thesis.

like UNU-INRA for example, that was how my relationship with UNU-INRA started. The Senior Policy Analyst gave me some work to do. Some consultancies and things like that. I did some conference holding the AfDB, African Development Bank and stuff like that. And then there were other stuff also from other places (P7, 18:88).

Luan obtained his PhD from a Ghanaian university. He presented his thesis findings at an international conference in Ghana. He mentioned that after his presentation –

people saw it as a unique study because it's just once a while they impound rivers and it was an opportunity that people were happy that at least somebody utilised that opportunity to study what was going on (P10, 16:48).

He did not receive many follow-ups from the participants through emails, but he felt satisfied with the comments he received during the conferences.

Danie presented the findings of his thesis to the government commission with which he collaborated during his fieldwork in Ghana. The major feedback was the discussions that came up after his presentation at the commission:

Yeah. After the presentation, there was a bit controversy of the outcome of my thesis. The final analysis was that our level of sustainability in terms of the forest management was in a transitional zone. And I think the Head of Forestry Services Department was not happy with my conclusions because already, I've made several publications that they've done a lot in terms of sustainability but as to the extent of sustainability, they were not in the position to actually say. But when I did the presentation with figures, data with, tables and graphs, they were surprised. Instead of where they were expecting to see the sustainability, they are still at the transitional zone. So it invited a lot of questions and interactions. Well, they were enthused, they were happy that we were making those efforts but the way forward was that they will get back to us, "you will hear from us", "the government will take it up" but apart from those words, we did not hear anything from them again (P11, 9:38).

He did not receive any emails after his presentations and had no further collaboration. However, there was some uptake by a key government body of his thesis. The issue of compensation payment to land owners became a topic for discussion at national level.

Ruan had participants asking for the publication related to his presentation. He said:

I did the presentation at the conference in South Korea. At that time, it was just the beginning I had not really published. People were really asking for the published paper but because, but at that time the publication hadn't come out (P13, 15:72).

Thys, who presented at an international conference at his institute, had participants asking him to publish from his work:

Yes, in fact even at the forum, and one of the key organisers came to see me and said, "I think you should give us three papers out of your work" (P14, 16:52).

Anje attended nine conferences during and after her PhD and presented aspects of her thesis. The feedback she got from participants at the conferences helped her shape the final part of her thesis. She said:

I think the feedback from the conferences also enriched my thesis. It's good I didn't finish everything before presenting because then I also got the global kind of perspective of what I was doing. I also see what others were doing in that area, how best I can also sharpen mine and enrich the whole process. It was quite an exposure for me, I think it built up my presentation skills, me being able to present to people, at the same time, try also sharpening my own research work and kind of prepare me for my final day of defending my thesis. In most of the cases, what happen was that if you went with a poster, the ones I did poster presentation I also had smaller one's poster leaflet so like A4 size so then we will come and then they will pick then there were others also I exchanged cards with them. So some will get back to me (less than 10 emails in total). I even know someone who came to Ghana, she was from the University of Oxford and based on my research asked me to support her with her research (P16, 11:50).

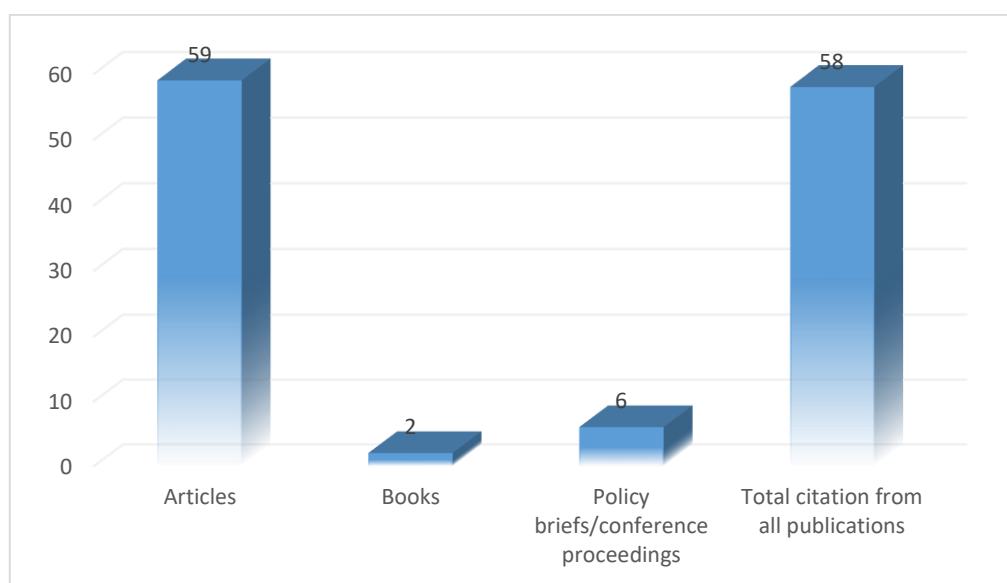
She also received a total of 10 emails from participants and others who wanted her to support them with their research based on what she had presented. It is clear that there was initial uptake of her thesis results after the conference presentations.

Feedback from the presentations of interviewees were through emails, discussions after presentations and comments from experts. Conference presentations seemed to be a first essential step in optimizing uptake of thesis findings. The type of conference also plays a role. If participants presented at conferences which were not related directly to the field of their work, the feedback was poor. Because the field of ENRS is very broad, there is a tendency that participants will not cooperate if the thesis research is rather technical, but was presented at a conference which was related to a social science field.

### **6.3 PhD research outputs**

Theses are the major outputs from any PhD research. However, there are other outputs which PhD graduates produce. These mainly include publications in the form of refereed articles in journals, policy briefs, working papers and conference proceedings. The outputs depend on the field in which the PhD author works. However, since the field of ENRS is an interdisciplinary field, the present study investigated all publications produced from the interviewees' theses.

From the CVs submitted by each interviewee, publications were compared with the thesis title, and articles referring directly to the thesis were considered an output of the research. These outputs were verified with the interviewee during the interview.



**Figure 6.1 Thesis-related outputs and citations**

From the analysis of outputs directly linked to interviewees' theses (see figure 6.1 above), a total of 67 publications had been produced by all 20 interviewees. Out of the 67 publications, 59 were referred articles published in journals, two were book chapters and six were in the form of policy briefs in working papers. Out of the 59 articles, 47 were published in international journals whilst 12 appeared in local journals, mostly based at the CSIR or their respective institutions.

The 67 publications produced a total of 58 citations. Each of the interviewees had an average of two citations from his/her article in a referred journal. Ten interviewees with 12 articles had no citation from all to the twelve articles. Zea, who was an academic at one of the universities in Ghana, had seven articles from her PhD published between 2009 and 2014, and had no citations from all her articles, while Gert had an article from his PhD with 24 citations since it was published in 2011. The number of citations to Gert's articles gave a high total count for the total number of citations. However, 17 articles of the total number of articles were unavailable online and this might have been the reason for the low number of citations from these articles.

When Gert was asked what might have contributed to the high number of citations from his articles, he said:



I will say that it is because it cuts across various disciplines, that is one. And it was the first paper that gave empirical evidence to a certain theory that was proposed by some author some years back. I actually sought to test that theory from that paper. My t paper actually gave empirical evidence (P7:33, 66)

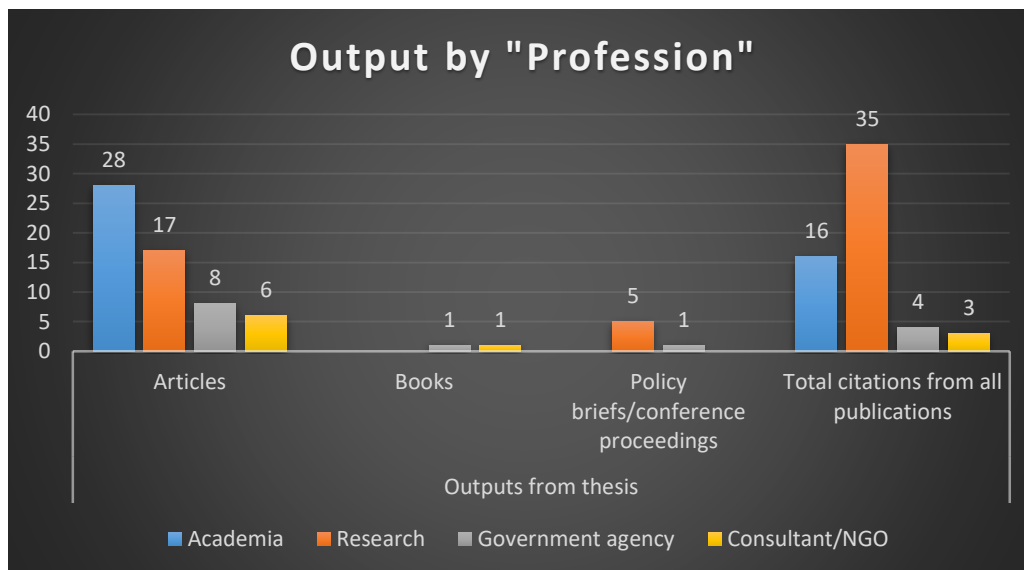
Figure 6.2 below shows the distribution of the output from the theses per professional field and their respective citations. Academics produced the highest number of articles from their theses: 47.5% of all the articles. This was followed by those in research. Researchers produced 29% of publications. Those in consultation and working for NGOs produced the least: 10% of articles directly linked to PhD theses.

However, academics produced no policy briefs, whereas researchers produced five policy briefs. When one academic was asked why she did not produce policy briefs as that is an easy way to get the knowledge that she produced to policymakers, she said:

I think it's also because of the promotion policy. I prefer to create peer review journal articles rather than conference papers and policy briefs because journal articles carry more weight than conference papers and proceedings. And you know for some journal when you publish the work as a conference paper, you are not able to resubmit it. Also when I came back there were so many other things that I was doing (P12, 29:160).

Anje worked for a government agency after her PhD. She developed a policy brief from her thesis. When asked why she developed it as it is not common for people in her field to do that, she mentioned that it was due to a fellowship she had that trained them to do that.

I was a fellow of AWARD and in AWARD one of the key things they taught us how to do come up with a policy brief, develop a policy brief, so I got back so happy so then I will develop a policy brief, at that time I went to ministry of land and resources something so I was so excited (P16, 18:73).



**Figure 6.2 Professional field and type of research output from thesis**

Although researchers produced less than 20% of the total number of publications of this sample, their articles generated higher numbers of citations than those by academics. Whilst the total number of citation counts of all articles produced by researchers was 60% of the total citation counts, academics only produced 27.5% of the articles. This could be attributed to researchers publishing more in international journals, which are often cited, while academics publish 'anywhere'. This is discussed in detail in subsection 6.6.1.1.

Overall, there is no literature on how many articles one has to publish from a thesis. However, if the requirement of an average of two publications is required from a PhD student in selected WCU before graduation, then it will be fair to say that interviewees produced more than the average number of publications from their theses.

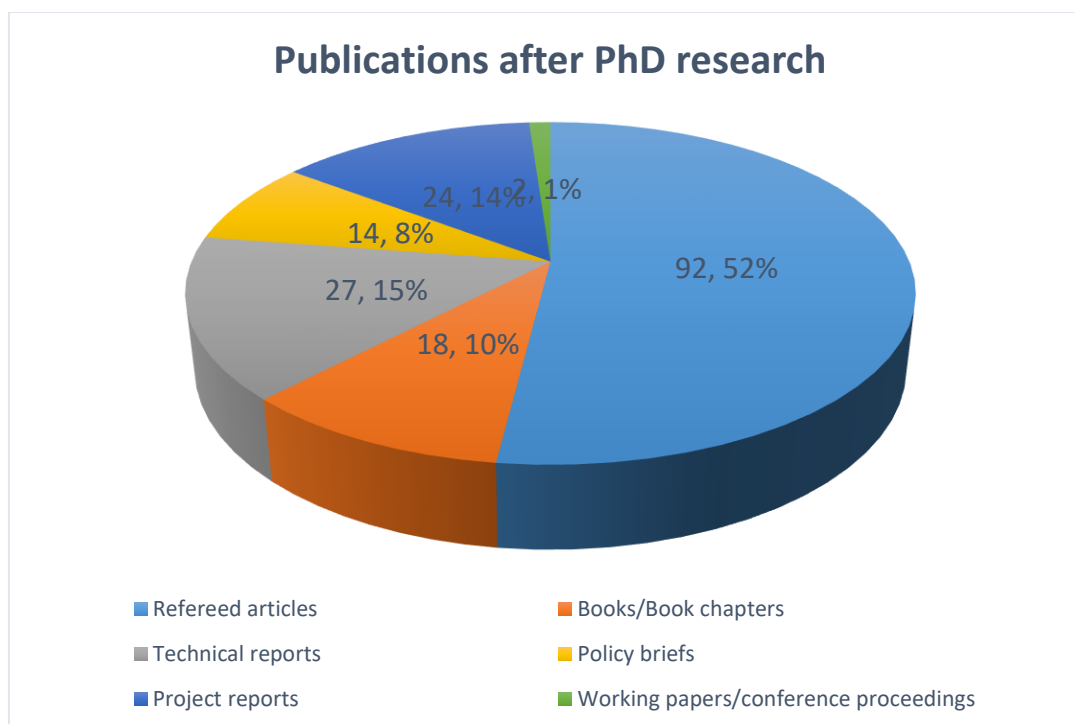
#### 6.4 Subsequent research output after PhD

This subsection presents the results with regard to publications that appeared after the PhD. These outputs are not necessarily directly linked to the theses but also to other research the interviewees have undertaken since their PhD studies. Figure 6.3 shows the research outputs from all interviewees after the PhD.

A total of 177 publications have been produced by 17 interviewees. Three interviewees (from research, consultancy and a government agency) have not produced any research output since graduating. Thys, who worked for a government agency, had not produced any output after he had obtained his PhD due to an illness after graduating. Ruan, who was a research

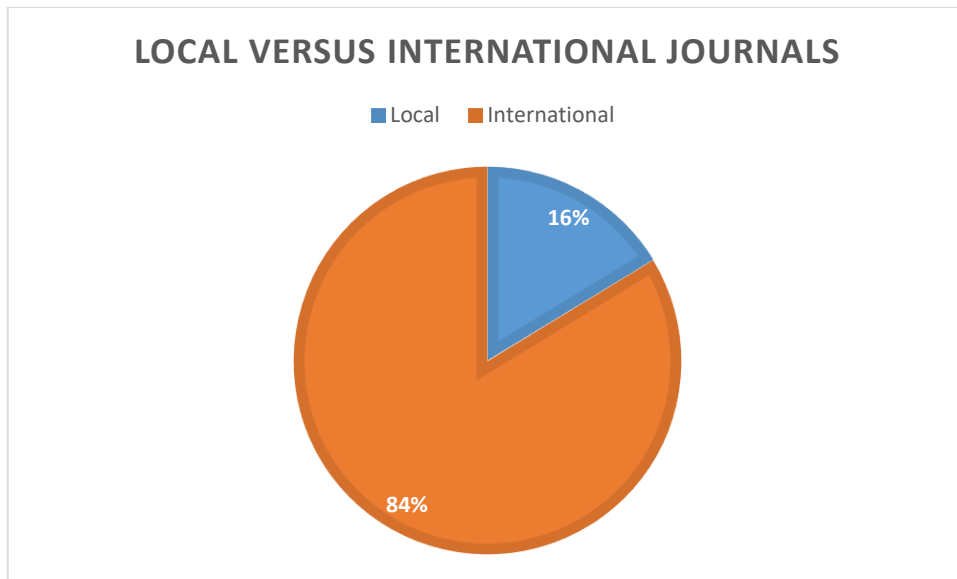
scientist, decided to take a break from writing after her PhD since she felt the work was stressful. Nico was a consultant who worked for most government ministries and he had not published because he felt that it was not a requirement for the work he did.

Of the total number of publications published by the interviewees, 52% are articles in refereed journals, 27% are technical reports; 24% are projects with 18% as books and book chapters. Conference proceedings constituted 1% as shown in Figure 6.3 below.

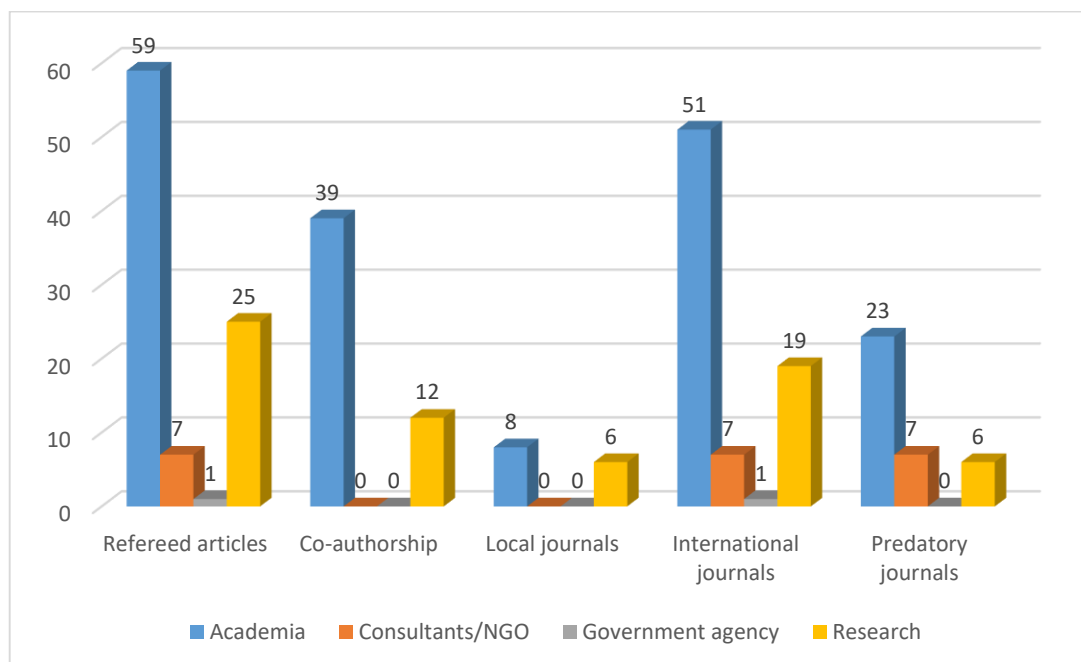


**Figure 6.3 Publications after PhD research**

Academics published most of the articles in refereed journals: 59 articles as compared to 25 by researchers at institutions. (See Figure 6.4 below) In addition, 51 articles out of the total number of 59 articles published by academics were in international journals and eight were published in local journals. The local journals are mostly housed in the respective institutions of the researchers.



**Figure 6.4 Place of publication of journal articles**

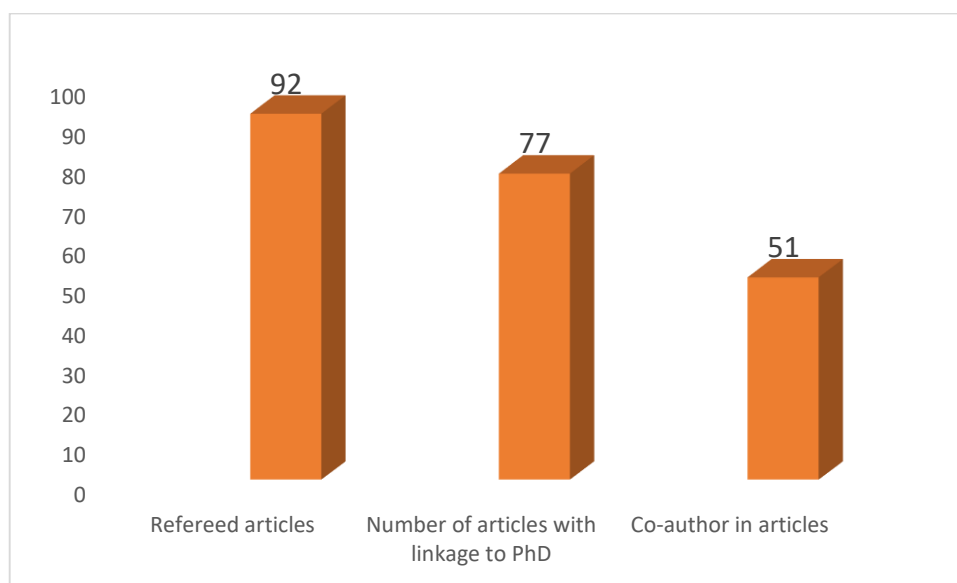


**Figure 6.5 Publication trends by professional fields**

The study also investigated the issue of co-authorship of refereed articles. Of the total number of 92 articles published by interviewees, the interviewees were co-authors of 51 of the articles. It was found that of the 59 journal articles published by academics, the academics were co-authors and not corresponding authors of 39 articles. Researchers were co-authors of 12 articles out of 25 journal articles.

The percentage of co-authorship was 55%. Although the high co-authorship amongst interviewees could point to high collaboration, it could also mean interviewees carried out less independent research after obtaining their PhD than before. David and Luan had the highest number of publications in their fields after their PhDs, publishing 16 and 17 journal articles respectively and each co-authoring 13 of these publications. David and Luan's corresponding authors were their undergraduate students.

The present study compared the titles of the articles published by the interviewees based on their PhD research to find out whether their subsequent publications were in line with their field of research for their PhDs. Of the 92 journal articles published by interviewees, 77 had a clear link to the fields of research conducted by interviewees during their PhD studies. (See Figure 6.6) The high degree of continuation of post-doctoral publications to doctoral research suggest good and even sustained dissemination and possible uptake of knowledge in their field.



**Figure 6.6 Articles, co-authorship and links to PhDs**

Not surprisingly those interviewees who now work for government agencies or for NGOs and consultancies published fewer articles after obtaining their PhDs than academics and researchers. Interviewees employed at government agencies and NGOs published only eight journal articles after their PhDs and were corresponding authors in all the articles. Their articles were also published in international journals.

Interviewees who had a fair number of consultancy posts after they had obtained their PhDs had also written a number of technical reports and project reports. None of these reports received any citations and could also not be found online.

Policy briefs are meant to communicate the findings of research to policymakers and stakeholders in the simplest form. Policy briefs formed almost 15% of all research outputs of interviewees after they had obtained their PhDs. These were mostly published by Lenny and Anje. The two worked as consultants on projects regarding water resources. Their jobs required them to publish policy briefs as a form of research output.

The interviewees were asked which sort of feedback they received – after they had distributed their PhD information – to assess the effect and use of the policy briefs. Here are the responses.

Lenny:

No, I didn't get any feedback from people we gave the policy briefs to (P8, 43:199).

Anje:

But I went to the ministry with my policy brief and oh God! I was so disappointed. No one was there to receive the policy brief. The receptionist received it and I left (P16, 19:73).

Kai:

Yeah, personally for the farmers I work with, I get feedback from them. When they encounter problems they call me (P18, 59:268).

The feedback on the policy briefs was low. Most of interviewees did not get any feedback from policymakers or other stakeholders. In the case of Anje, the policymakers at the ministry were not in the position to receive it.

Overall, interviewees published more journal articles than policy briefs or other forms of research output. Furthermore, interviewees usually collaborated with their colleagues to publish articles and these publications usually appeared in international journals rather than in local journals.

Findings in this section are in line with earlier work done by Hernon and Schwartz (2002), Lee and Boud (2003), McGrail, Rickard and Jones (2006) and Kamler (2008). According to Hernon and Schwartz (2002) and Lee and Boud (2003), decisions on crucial issues of hiring, tenure and promotion are largely determined by publication rates, and the scholarly performance of faculty members has traditionally been assessed by 'straight counts' of publications.

Publications are increasingly used in universities to measure personal and institutional performance, as well as being a criterion for achieving academic promotion and competitive research funding. When the results of research are not published, there are diminished opportunities for the kinds of professional dialogue and knowledge building that can take a field forward (Kamler, 2008).

Nevertheless, McGrail *et al.* (2006) report that, whilst a small minority of academics publish a great deal, publication outputs in general are quite low. In their review of published literature, they cite a number of reasons why academics do not write for publication, such as a lack of momentum, motivation and confidence, and the lack of a framework or formal structures to sustain and support writing.

## **6.5 The issue of predatory publications**

This section presents the results of how interviewees select journals in which they publish their articles. In addition, the subsections show how much interviewees paid publishers and whether the interviewees received reviewer's comments after they had submitted their manuscripts to the publishers. Finally, interviewees' knowledge of predatory publishers<sup>13</sup> and publishing with predatory publishers is presented and discussed.

### **6.5.1 Publishing with predatory outlets**

The study compared the journals interviewees used to publish their research findings after they had obtained their PhDs. Given the growing concern about doctoral candidates being tempted to submit their manuscripts for publication in predatory journals, we compared the list of journals of our interviewees with Jeffery Beall's list of predatory publishers (Beall, 2012). As shown in Figure 6.5 above, of the 59 journal articles published by academics, 23 were published with predatory publishers, whilst six of the 25 were published by researchers with journals which were predatory outlets. For those working for NGOs or as consultants, all of the seven articles they published were with predatory publishers.

Of the 20 interviewees, 12 had published one of their journal articles in a predatory journal. They were mostly co-authors in these publications. Interviewees who published with international journal publishers were the ones who mostly published with predatory outlets. David and Luan were from the same institution and had the highest number of publications

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<sup>13</sup> journals that exploit the page fee model for self-gain (Beall, 2012)

with predatory publishers. They published 45% of their publications after they had obtained their PhDs with predatory journals. In all of those publications, Luan and David were co-authors with the corresponding authors who were their undergraduate students.

The number of publications by interviewees in predatory outlets is high. This has an effect on the future prospects of interviewees. During their assessment for promotion, the articles could not be found online or the publishers did not exist anymore. This will affect their chances of promotion. These publications could not be found online less than a year after they had been published.

### **6.5.2 Knowledge of predatory journals**

Since some interviewees were found to have published in predatory journals, the interviews were used to establish whether they in fact knew about predatory publishers and their activities as well as when they heard about predatory journals (PJ). The responses of the interviewees are presented below.

Harrie:

No that term; I haven't heard about predatory journals before (P5, 44:164).

Piet:

I haven't heard the term predatory journals but I think I know what you are talking about (P6, 46:126).

Ben:

Predatory journals? No (P9, 34:214).

The above respondents who worked as consultants with government agencies had never heard of and had no knowledge of predatory publishing. However, the following respondents, mostly academics and researchers, have heard about predatory publishing and had some knowledge of the practice.

Lenny:

Yes, I have heard of predatory journals (P2, 94:141).

Jan:

Yes! predatory journals (P3, 45:83)

Gert:

Yes, I have (P7, 39:170).

Janco:

We were about four at a point. I didn't want the others to say I'm stingy or so I did. Later on I



saw it was the Canadian centre for science and education I got on their site and I saw it. Two months later someone told me KNUST has a listed number of journals they do not recognise and this particular journal was among the list (P9, 20:77).

Luan:

Yes! Yes! I have (P10, 47:125).

Ruan:

Oh yes. Very much! (P13, 30:113).

Nico:

Predatory ... yes I've heard (P20, 26:111).

Nigel:

I remember my professor did mention it some time back (P21, 33:89).

Overall, more than 13 interviewees have heard about predatory journals before. Most of these interviewees were academics and researchers, but they had studied abroad for their PhDs or attended a meeting abroad within the previous four years.

Selected interviewees who had heard about predatory journals were then asked for their understanding on what predatory journals were. Here are their responses.

Lenny:

One, you send your paper they publish within a day or an hour, they don't even review, they don't make corrections, they publish it as it is and they charge you for it, for doing no job (P2, 54:148).

Gert:

I think, in my understanding, they are journals that don't give enough attention to review of manuscripts and they are just in for the money. So you can send your article to them and in two weeks they will give you a review. Usually the review is not very thorough (P7, 40:173).

Zonja:

But I didn't know much about them until one time I submitted a paper to one journal and the next message I got was that your article has been accepted for publication, pay this for publication. So I wrote to them that why are they charging me. You know I was wondering, you didn't review the thing and you are just going to publish it. So I decided to forget about them. And that was one of the papers I gave to Ghana Science that at least here it will be reviewed and published. So I think it was last week that a friend told me there is this publication online. Looks like they still went ahead to publish it anyway. So in fact, I wrote to them that they should make sure that they publish it because they didn't peer review it and they just published it so I wasn't interested. So I don't know whether it's been deleted or not (P15, 42:183).

Interviewees who had knowledge of what PJ were asked when they first heard about them. Interviewees mostly responded that they have heard of PJs no more than five years before

being interviewed:

Harrie:

long time ago maybe five years ... we have had seminars we have had trainings and those thing. We have Institute for Science and Technology Research and is it part of CSIR (P1, 39:105).

Lenny:

somewhere last two years (P2, 53:146).

Zonja:

Few months ago. I think some time last year towards the end of last year I think the last quarter they sent a list of the predatory journals (P15, 41:177).

Our findings are in line with recent research by Adele (2016). Adele asserts that African academics and universities have been caught in the predatory journal web. It is imperative that universities on the African continent start taking this threat to their integrity seriously. Africa is not immune to these journals. In 2012, the *African Journal of Business Management* (AJBM), headquartered in Nairobi, Kenya, had about 100 journal titles in its stable. In 2011 alone, this journal published more than 1 200 articles. Individual authors or their institutions paid page fees of around R5 000 per article to a New York bank account. That is an estimated income of R6 million per year. To Adele (2016), the long-term cost for academics and their institutions includes less visible costs to ignoring predatory journals. In the long term, brands and reputations can be destroyed, costing universities the chance to collaborate internationally with well-regarded institutions (Adele, 2016).

### 6.5.3 Reasons for opting for predatory publishers

Interviewees who had any of their articles published with a predatory publisher were asked why they opted for them. The responses of the interviewees are presented below.

Willem, who was an academic with a public university at the time of this research and who had two of his articles published with predatory publishers noted that the problem is with the well-established journals.

You see, the problem is that sometimes you find it difficult to publish in some of these journals. Because one, they look at your set up, they look at your instrumentation and also the data requirement. And looking at our stage, I have a very good paper, but because of the data they say no it's not good for hydrological sciences so I should publish it somewhere else. And sometimes they tell you publish in a local journal. So you go to a journal that can or would publish it. Also that time the predatory list hasn't come out. So in this case one gets confused to whether this is a predatory journal or not. Because looking at our part of the world where you have...even the journal return period is very high and you need some number. When you send

some article they will tell you that send it to a local journal, we don't publish this. So where should we publish? (P2, 55:160).

To Willem, the orthodox and well-established journals have strict requirements, which researchers in developing countries cannot meet. These orthodox and well established journal publishers require long-term data for publication in the field of environment and natural sciences. These requirements by the recognized journal publishers compel researchers to publish with predatory publishers (PP). According to Willem, PPs have fewer requirements. In addition, Willem noted that at the time he published his articles in PJs, there was not a list of predatory journals to which he could compare the journals.

Zea published in a PJ because she attended a conference and met one of the editors. In addition, the research was a project, and since the project was coming to an end, she needed a journal that was going to publish her article on time. She said:

There was one on something with learning. It was a project so the project actually paid for it because the project was actually ending so the money was going waste. No, I got a mail from one of the editors some time ago there was a meeting they wanted me to attend in South Africa but I couldn't go. They wanted me to attend a meeting on tourism, but I've move away from tourism (P12, 46:253).

Zonja, who was a research scientist with the CSIR and had two of her publications with a PJ, expressed similar views as Willem, who also published with a PJ:

Apart from that it's the kind of expectations. I will give an example. I was in the UK last year and I went to the aquaculture centre, I saw the facilities they have there and the kind of research they are doing. We do similar studies over here but the kind of data they collect we don't collect a pinch of that. Do you get it? We don't have the facilities yet they expect you to have the same quality of research as they have there and sometimes it's a problem. I worked with one student and she wrote a paper which we submitted. That's the paper I said we submitted to a South African journal recently and when it went what they came out is that this has been done several times, do you get it. Not necessarily from Africa but the other from their end. So they weren't interested. So sometimes these are some of things and you can try. I have colleagues who said they told them to look for local consumption or local whatever. So I think that is what is promoting these predatory journals (P15, 43:187).

To Zonja, the requirements to publish with established journals cannot be met by African researchers because the instrumentation available for research and the data generated by researchers in developed countries are not the same as those in Africa. That is why African researchers opt to publish with PPs.

The views expressed by Willem, Zea and Zonja, who were academics and researchers at the time of the study, were also expressed by other interviewees and researchers across other professional fields in African universities and research institutions as discussed by Altbach (2014).

The responses are in line with views expressed by Altbach (2014) in the *World University News*: top journals are increasingly selective and remain dominated by the main academic centres, which means limited access to others. Further, these well-established journal publishers are controlled by large multinational publishers that charge high prices for access.

Taking advantage of the Internet, new 'open access' journals have emerged – although their quality and rigour are questionable. 'Fake' journals that will publish anything, if a fee is paid, have proliferated – as have a growing number of vanity publishers that will publish books for a fee (Altbach, 2014). In short, there is much confusion and considerable anarchy in the knowledge communication business today Beall (2015).

#### **6.5.4 Other issues regarding research output publications**

The following subsections discuss other issues which affect the research outputs of scientists. The issues discussed are factors that can also be used to assess efforts made by the authors to ensure a fair to good uptake of their work.

##### **6.5.4.1 Article publications fee**

The researcher asked interviewees who published with PPs whether they had paid and how much they had paid for their articles to be published.

The results show that interviewees paid between USD 100 and USD 400. The responses to the questions regarding how much they paid for their articles to be published are presented below.

Samuel published all his seven journal articles with PPs. He paid between USD 100 and USD 300 for each of his publications. Samuel said:

Between 100 dollars, to 300 dollars. Some 100 pounds. It was the UK one, they gave a discount for those of us in the developing countries. So about three of them they gave me at a discount (P5, 15:81).

Gert, who was a research scientist at CSIR, also paid that much to publish a manuscript with a PP. Gert said:

I think it was something around 300 dollars or 400 dollars (P7, 29:120).

Luan, who was a lecturer with one of Ghana's flagship universities, paid for his publication with a PP. Luan said:

Pay I think \$100 per page or something (P10, 29:71).

Zonja, who was a research scientist with the CSIR, paid USD 50 to publish his manuscript with an Indian PP:

I think was it \$50 dollars or something? (P15, 36:147)

Ben was a director of one of the research centres at a public university in Ghana. He had three of his publications in predatory journals:

The Applied Biosciences I paid about \$150. The other ones, I think for the Journal of Botany we paid almost \$500. Then for the American Plant Sciences we should have paid about \$400 or \$500. But fortunately, Dr B was one of their editors so we had a rebate. In fact, it was also one of the things that skewed [...] this thing ... the choice (P19, 17:119).

Interviewees paid that much money to get their manuscripts published. This is because they wanted more publications as soon as possible to aid their chances of promotion at their various institutions. These journals which they paid are no longer available online. In some cases, the journal publishers have gone offline.

The paying of page fees is a historically acceptable academic practice: when an article is accepted, the author or his or her institution pays the publisher a fee for the work involved in producing that article. Now, though, it has been transformed into a money-making business (Harnad, *et al*,2008).

The findings above are in line with Adele (2016). He asserts that one journal in Kenya (the *African Journal of Business Management*) in 2011 made USD 625 000 in publishing 1 200 articles.

#### **6.5.4.2 Article review exchanges**

Interviewees were asked whether they received comments from journal reviewers on their manuscripts and how many times they had exchanges. Interviewees responded that they mostly received between two and four exchanges.

Harrie:

Oh about two exchanges from reviewers (P1, 25:62).

Samuel:

It depends, they send from all the pre reviews whether three or four. They bring all for me, to know the comments, what they say, and then I incorporate them, send it, then they will do another review and send it back to me for my approval before they publish (P5, 18:85).

Gert:

Once for most of the articles I published after my PhD. But there were comments from three reviewers (P7, 26:109).

Luan:

The *Journal of Aquatic Science*, about three times it went through. Then the *Journal of Applied Science* research, that one I think once. The other one minimum of two. When it comes and you make your input. When it goes, most of the journals they send it back to the reviewers by then the second time it will be minor comments which they will give (P10, 23:67).

Zea:

I think two exchanges, but it took a year to get the reviewers' comment (P12, 35:207).

Ruan:

With the first article got a major revision. So then the major revision meant that you really had to do a lot of work, so I did a lot of work and then I sent it and then it went for review again and I got a minor revision. Then finally it was accepted. So I did about 3 rounds of real work on the article. And then for the PLoS One paper it was a normal review and then I did it and then it was accepted. Like the reviewers' comment came I like incorporated their comments and then I sent it and it was accepted (P13, 22: 90).

Thys:

Yes, sometimes even three times before they publish (P14, 34:117).

Zonja:

It was just once (P15, 35:145).

Kai:

At least two times for the plant sciences, twice. In both cases, we had it twice. Biosciences once each (P18, 20:79).

The above interviewees were academics, researchers and employees at NGOs, and they had fewer than three exchanges with reviewers before they were published. Most of the interviewees had at least one publication with PP or with publishing outlets that could not be found online and also with local journals.

However, interviewees who mostly did not have any of their articles with PPs received more than three exchanges before their manuscripts were published. Most of these interviewees were very selective in their choice of journals. They read up about the journals and also identified them during their literature reviews. Responses to questions in this regard are

presented below.

Willem:

This was [...] about five. I would say about four times. But it took quite a long time. Sometimes the reviewers delay (P2, 35:102).

Luan:

Yeah, with the Taylor and Francis one, about five or six times (P10, 22:65).

Danie:

I think like four times (P11, 25:132).

David:

for one of them I can show you. The paper itself was around 25 pages. I had comments of over 30 comments that I ended up, my submissions were over 30 to 40 pages and it came in three formats. First review came and second one, third one. It was actually tedious (P17, 18:82).

The number of exchanges and the tedious nature of the revisions that interviewees had to do before their manuscripts were published in high-impact and recognised journals made some authors want to publish with PPs, local journals or regional journals. However, interviewees shared the views that the quality of their manuscripts was highly improved with the comments that came from reviewers of high-impact journals.

## 6.6 PhD thesis citations

The general output from all PhD research is the thesis. PhD theses are therefore a good reflection of the predominant lines of work and research at universities and other academic institutions. To determine the number of citations that these theses generated, the candidate used Google Scholar as the main source. The results are shown in Table 6.2 below:

The 20 dissertations analysed in this study generated total number of 97 citations of which 14 were author self-citations (See table 6.2 above). From the interviews it was interesting to discover that the interviewees knew 40 of the persons who cited their theses. However, there were 43 unknown people who the interviewees did not know but cited their work.

The thesis with the highest number of citations was Zonja's. The high citation rate of Zonja's thesis can possibly be attributed to the fact that her study was one of the first done in her field of research in Ghana. Nico's thesis was the oldest of all the theses and was published in 2006. It has generated 6 citations. Most of the people who cited the theses of the interviewees were either colleagues at the interviewees' current institutions, students who studied at the same university where interviewees did their PhD studies, or people interviewees met at conferences.

The eight interviewees who obtained their PhDs from Ghanaian universities between 2009 and 2013 received a total number of 14 citations (with three self-citations) for all eight theses. Anje, who graduated 2010, had her thesis cited nine times out of the 14 citations.

**Table 6.2 Citations and the relation of the interviewees to the citing authors**

Name of Interviewee	Country	Professional field	Year of obtaining PhD	Number of citations to thesis	Number of self-citations	Number of citers known to the interviewee	Relation to most citers
Zea	Germany	Academe	2009	0	0	0	
Ben	Ghana	Academe	2012	0			
Piet	Ghana	Consultant	2013	0			
Thys	Ghana	Government Agency	2010	0			
Samuel	Ghana	NGO	2013	0			
Harrie	South Africa	Research	2010	0	0	0	0
Ruan	The Netherlands	Research	2014	0	0	0	0
Luan	Ghana	Academe	2014	1	1	0	0
kai	Ghana	Research	2009	1			
Gert	UNESCO-IHE	Research	2013	1	1	0	
David	ZEF	Academe	2012	2	0	0	
Danie	Germany	Academe	2010	3	0	0	0
Janco	Ghana	Academe	2011	3	1	1	Colleague at work
Nigel	UNESCO-IHE	Academe	2011	5	0	0	
Nico	Germany	Consultant	2006	5	0	0	0
Anje	Ghana	Government Agency	2010	9	1	4	Meet them at conferences
Willem	ZEF	Academe	2007	11	2	8	Students in his former university
Jan	ZEF	Research	2008	14	4	7	Colleagues at work and students at former university
Lenny	UNESCO-IHE	Academe	2007	17	2	10	Postgraduate students and colleagues in the field
Zonja	UK	Research	2008	25	2	10	Colleagues at work and students at former university
			TOTAL CITATION	97	14	40	



The ZEF group, made up of three interviewees (Willem, Jan and David) who received their PhDs from a German university between 2007 and 2012, had 27 citations (with six self-citations). Most of those who cited the theses of the interviewees were former students who studied at ZEF and colleagues who worked with them on the ZEF project. Others who also cited Willem, Jan and David were colleagues with whom they worked at the time of this research. All three had some level of contact with 15 of the persons who cited them.

Three of the interviewees (Gert, Lenny and Nigel), who also obtained their PhDs from UNESCO-IHE between 2007 and 2013, had 23 citations (with three self-citations) from their theses. Lenny's dissertation, published in 2007, received 17 citations out of the 23. Gert, Lenny and Nigel had some contact with 10 of the people who cited them.

Six of the interviewees who obtained their PhDs "overseas" (South Africa, United Kingdom, Germany and the Netherlands) between 2006 and 2014 had their theses cited 33 times (with three self-citations). However, only Zonja's thesis was cited 25 times out of the 33 citations. This means most of the theses had no citations. Overall, out of the 20 theses, seven theses had no citation, three theses had one citation and four theses had three to five citations during the period. Four theses had 10 to 25 citations.

With regard to the professional fields in which the interviewees worked after obtaining their PhDs, researchers and academics received a total of 41 and 42 citations respectively, as compared to five citations for those working as consultants, nine for those working for government regulatory bodies and zero for the one working for an NGO.

There is no generally accepted benchmark as far as citations to theses are concerned. But if we assume that an average of five citations (with maximum of two self-citations) per thesis for a five- to 10-year period after obtaining a PhD represents a fair and average uptake of the thesis, then one could argue that these theses on average experience moderate uptake.

If we raise the bar and assume an average of 10 citations per thesis (with at least three self-citations) over a five- to 10-year period to represent a good uptake of the research, then we will have only four out of the 20 theses to have had a good uptake. These four theses are those of Willem and Jan (both from ZEF), Lenny (UNESCO-IHE) and Zonja (United Kingdom). Two of the four were with research and academic institutions. Two also did their PhDs under the auspices of a larger project and that would have contributed to the good uptake. The theses by Lenny and Zonja have had a good uptake due to other reasons, but the most prominent reason is that in both cases, their PhD research was the first in that field in Ghana.

They undertook the PhD research when the field was emerging. All of the four interviewees whose research experience good uptake, did their PhDs outside Ghana and in the field of water resources. The good level of research uptake of the four interviewees' research may also be attributed to the fact that water resources is an emerging field and that little research had been done and published.

## **6.7 Uptake of thesis recommendations into policy or practice**

After presenting thesis findings at conferences and other forums, uptake of the findings begins with the utilisation of the recommendations made by interviewees in their theses. Interviewees were asked whether they had been in a position to make sure some of their findings and recommendations were utilised for policy or practice at national or local level. Furthermore, interviewees were asked whether they knew anyone in government or in another position to whom they have suggested their findings and, by extension, their findings to be utilised for any policy discussions. See section 6.5.1 for interviewees' answers in this regard.

### **6.7.1 Efforts by interviewees to optimize uptake of their thesis recommendations**

At the time of the present research, Luan was a senior lecturer at one of the public universities in Ghana. He graduated from one of the flagship public universities in Ghana. His PhD study made an explicit recommendation for policy and practice in the field of fisheries management in Ghana. He has done fairly wide consultancy work in his field and has collaborated in consultancies with other researchers from Ghana, Togo and Burkina Faso. He has been to several local and international workshops and conferences. When he was asked whether he has been in a position to suggest his recommendations for possible uptake and utilisation, he said:

I'm not in that position because like as I said the Bui reservoir or the Environmental Protection Agency (EPA), they came up with a committee. I expected that having done a major work like this perhaps and even coming from academia they could have made me a member (P10, 33:87).

For Janco to be in a position to suggest and make sure his recommendations are used, he had to become involved in projects that were related to his field. If he were involved in projects by the appropriate authorities, then he could ensure the use of his thesis recommendations. David graduated on a project at ZEF. He has had a fair number of consultancies with selected local and international institutions. His thesis made specific recommendations to policy and practice in soil management. At the time of this research, he was a senior lecturer at one of the public universities. He believed he was in a position to ensure that he shared his

recommendations, but could not ensure implementation. He said:

I can only suggest and so to implement would be very difficult. So I can only delve into the knowledge to discuss and help people to understand the concept and all that, but to implement, really, I'm not in a position to ensure its uptake at whatever level (P17, 25:106).

David believed that, as an academic, he could only discuss the knowledge he had gained and produced from his PhD with the stakeholders for them to understand the concepts. But the implementation of the recommendations lies with those in authority, including policymakers.

Kai worked for the CSIR after his PhD. His thesis made recommendations for practice and not specifically towards policy. He mentioned that because he worked with farmers most often and gave them technical advice, he took some of the recommendations in his thesis into consideration:

Like I'm still working here as a seed scientist and I interact with farmers a lot. So some of these recommendations sometimes they come to me ... they may still supply them seeds. Farmers we supply them with a lot of tree seeds every year, as well as seedlings. So when we supply those seeds and they are going to grow them, we give them a lot of technical advice. So I take some of these recommendations into consideration (P18, 22:85).

In his study, Ben investigated the pollination ecology and cocoa production in Ghana. He made explicit recommendations towards practice in his field and not to policy. He mentioned that he had tried to take his recommendations into consideration when working with farmers:

The first one when you talked about information to the farmers, I'm happy to say that we took it up through the support gate. So organising farmer's rules, farmers telling us about their idea about cocoa pollination. In fact, the farmers even have come with the Akan name, 'cocoa kunu'. They have come up with that name. And then working with the farmers because it was also the work I had done I was much more interested in it. So that one is there. Now the other one of detailed study of the metro ... to my knowledge now nobody has taken it up. You see when I went through literature, one of the things Dr [name of professor] mentioned was that people easily ... even people who work on cocoa acknowledge it and after some time they shift (P19, 19:134).

Therefore, Ben was ensuring some level of uptake of the recommendations by himself, and he also mentioned that his work was well acknowledged in other publications and work in the field. That was also a good form of uptake.

### 6.7.2 Knowledge of thesis recommendation uptake

Theses are public documents and the substance of the highest academic research degree. This study assumed people might have read the thesis and found some of the recommendations useful. Interviewees were therefore asked whether they had knowledge of the utilisation of their recommendations or findings. The results of them having knowledge of the use and uptake of knowledge from their studies are presented below.

Harrie worked at the CSIR as a research scientist at the time of this research. His thesis made specific recommendations towards policy and practice in the management of groundwater resources. His thesis focused on South Africa. At the time of this research, he had no idea whether there had been some level of use of his recommendations:

I have no idea. It will be difficult to know. It is difficult in the sense that because I don't live there, it will be difficult to know exactly. But there were people, for example, where we picked data from we sent them a copy of the reports. There were a couple of other organisations who also were involved with the PhD. So we sent a couple the reports back to them because that was the condition that when we take data from them we give them a copy ... so I just hope that they might have found one or two things that is useful (P1: 27:69).

In his view, since he no longer lived in South Africa and also did not have any contact with the institution he collaborated with during his study, it would be difficult to know if any of them were using the findings in their work.

Samuel's thesis focused on ground water provision as a key catalyst for rural poverty. His research had focused on how to improve on policy and practice. He retired the same year he graduated and was staying at home at the time of this research. He believed no one was using his findings:

No!!!! Because for me now it all is with the academia. If any are out, it is what came out in my article journals which anybody outside the academia have read. They might have picked up as part. Once I don't have the platform of directly going to influence policymakers. Yeah these are some of the things which I don't know how far for the universities, beyond what students or a candidate recommend. As they are pick up, made it into seminars for people to use. For me it would have been only useful for the department to do that and they might have invited us to join but If that is not being done, then I am counting on now that Lambert Publishers is turning them into books. Once the books are into the system, maybe some policymakers may read them (P5, 22:96).

Samuel believed that knowledge generated from his thesis and other theses was just kept with academia. The knowledge was published in articles which no one outside the academic world

reads. Furthermore, he believed he had not had an appropriate platform to influence policy with his thesis recommendations. He suggested that the way forward is for universities to get other stakeholders involved in PhD students' seminars.

Piet was a private consultant at the time of this research. His research focused on droughts and migration in Ghana. The study sought to inform policy and practice. When asked whether he had knowledge of the use of his thesis recommendation, he mentioned:

no I don't know anyone particularly but honestly I haven't seen any you know sort of policy linkages to my work (P6, 26:68).

He had no idea whether there was some use of his thesis recommendations. He also had not seen any policy which was clearly linked to his work yet. To him there has been no uptake of his recommendations by anyone he knows.

Ruan's worked as a research scientist at the CSIR at the time of this research. Her study investigated functional traits that determine drought performance, and the distribution of tree species in tropical forests of Ghana. The study sought to inform policy in the field of climate change at local and national level. She mentioned that, as far as she knew, no one was taking up her thesis recommendations:

No, I don't really think so. Actually, I think that probably like when I came I should have given them to the forestry commission since I had very good recommendations that could help the forestry commission. I spoke to the people at Resource Management Support Center (RMSC) and the director said oh we'll call you to come and make a presentation sometime but well I have not really followed up and they have also not followed up so I don't really see anybody directly taking up any recommendation to do (P13, 25:100).

Ruan reported that she had made some efforts to present her findings to the government agency which is in charge of policy in her field of work and study. She believed that would be a good platform to let her colleagues and policymakers be aware of, and by extension, use some of her recommendations.

David's research was on spatio-temporal dynamics of bush-fire nutrient losses and atmospheric depositional gains across the northern savanna region of Ghana. The study made explicit recommendations in terms of policy for soil management in rural community development. He noted that, at that stage, no one had up taken his recommendations. He said:

no, it hasn't been taken up. You see it's a system that we currently can't do away with. Our

natural system is that people would burn because it eases land preparation and that can't be taken away from them and it will be difficult for you to ask someone to stop burning and then pay for a ploughing service for instance you know so yes economic wise people would be very reluctant to do that (P17, 22:98).

David's assertion was due to the persistence of the problem he investigated in communities and also the logistic challenges for communities to be able to implement his recommendations. However, these recommendations first had to be adopted by authorities and then the recommendations could be extended to the communities.

The above interviewees were consultants, researchers and academics. They had no idea whether anyone had in fact used the knowledge they had produced during their studies. Their assertions were due to that fact that they have not had the appropriate platform to do it themselves. Knowledge generated from their theses was mostly stuck with academia and seemingly did not reach policymakers and other end users. The persistence of the problems raised in the theses also hindered uptake.

Another set of interviewees had some knowledge of the uptake of their thesis recommendations. They were aware of some institutions or individuals who were using the findings of their work.

Jan was a research scientist with the CSIR at the time of the interviews. His PhD research was one of the first to be carried out in the field of climate modelling using the chloride mass method in Ghana. The study sought to improve the practice in the field of groundwater resources research in West Africa. He had knowledge of the use of his findings by a particular institution. He said:

I know of this work done by it was done through WRC but is funded by IDRC. The water resources commission but funded by IDRC which is the Canadian one and that was looking at groundwater use. It is called the hub project looking at hydrological assessment for the three northern regions. Yes, and one of the things they worked on was on the specific yields and specific what we call re-charge. Those are linked to ground water recharge which are important parameters for computing a groundwater recharge and they play important role in terms of what recharge value that they come up with and is not been studied extensively in Volta basin. I started my PhD work before they started and we had some collaboration along the line. They were calling Volta project and many were in line with my work on groundwater and they were working on ground water so we had a lot of collaborations and that they took a lot of information from me which helped with the work they did. They shared some of the values (data) with me. I think I finished before their work completed. They shared some of their results with me and I

noticed they have completed their project (P3, 20:38).

According to Jan, he collaborated with the institutions during his PhD and also shared some of his findings to improve the outcome of the projects. Since his thesis was in line with the project, they used his findings.

Danie asserted that after his PhD studies, there was public awareness of the payment of compensation to farmers in forest communities which, before his publication, was not discussed by stakeholders in the field. He therefore thinks there has been some uptake of his recommendations, although he could not establish a direct link between that and his PhD results. He said:

What I know of, is with the compensation. I think after this publication in the journal came out, there have been some review on how to pay compensation to the traditional rulers and all those who were involved and affected by timber harvesting. I cannot link that policy review by the government differently to my recommendations but the issue came to fall after I published on it (P11, 26:140).

Zea's PhD study investigated the role of environmental values and attitudes of Ghanaian coastal women in natural resource management. At the end of her study, she made explicit recommendations for policy and practice. She was working as a researcher and an academic at one of the public Ghanaian universities at the time of this research. She had been involved in discussions and research projects where selected recommendations from her thesis had been adopted and incorporated into working documents and discussions. She said:

And the first recommendation was one of the key things taken up, making sure that we develop the policy because the institute was part of it and when you read Professor GC book another colleague and Dr ML. So it was quite over a long period of time, the consultation took a long time. You know just because we wanted to get as many stakeholders as possible to be involved in the policy process. So the first one is still relevant and there has being some up take when you look at the ... the implementation planning and all that, it's also been very consultative making sure that there are a lot of stakeholders at the ground level; the local level been involved. Because it's important to have policymakers buying into all that. The second one is still relevant but it's still an issue. I remember in one of the presentations even Professor GC took some part of my thesis and inserted it into his presentation. Because there was a table inside that look at people's access to knowledge and modes of acquiring knowledge; through television, radio whatever. I mean these are things that people know (P12, 13:106).

In addition, at the time of the interviews, one of her PhD supervisors, who was the Director of the Institute with which she worked at the university, had also adapted some part of her thesis



for work he was doing. Zea had knowledge of how some colleagues and policymakers were utilising her recommendations.

Thys's research looked at the ecology and management of elephants (*Loxodonta Africana Matschie*) in the Bia–Goaso forest enclave in the Western Region of Ghana. The study made explicit recommendations to the practice of community development. He attributed a project implemented by the FAO in the study area of his thesis to some of his recommendations, although he could not establish a direct linkage:

I will say that fortunately for me this particular one, the one you just read, the FAO (Food and Agriculture) currently has a project just to establish CREMAS between Ghana and Ivory Coast (P14, 21:70).

Nico had heard parts of his thesis recommendations being discussed on radio. He could not establish a direct link whether what was discussed was directly from his thesis, but he mentioned that all the recommendations discussed on radio were captured in his thesis:

Well I'll tell you something, I have heard discussions on radio or policy discussions about how sustainable solid waste management ... for example the issue of waste separation at source. Looking at the organic composition of our waste, we need to separate the waste at source and then process the organic component that leave the ... All those discussions, all these things were captured in my thesis and that were also presented to the tax force. But as to whether I have ever heard anybody making ... and then there were also issues of looking at solid waste management from regional perspective where you'll look at the development management of solid waste from the lower communities, rural areas up to pre-urban to urban. Those are issues that I discussed that when implemented would have but ... You know the issue of waste management in Ghana is in the domain of local government. And you want to sometimes avail ... I participated in some workshops, you make recommendations people think oh! this we've heard it before. Sometimes they think it's an abstract concept. In my own small way, that is my conservation, but I cannot impose my perspective on people who are in the realm of affairs (P20, 15:51).

In addition, he believed he had made some efforts by participating in local workshops and made recommendations to the organisers. He also believed the final utilisation of the recommendations lay with the local government authorities and all that he could do was to discuss the knowledge he produced from his thesis at forums when an opportunity presented itself.

Nigel's PhD research was on sustainable irrigation development in the Volta Basin. The research sought to improve both policy and practice in the field. At the time of this research,



he was a consultant for a project implemented by the government of Ghana. He mentioned that the knowledge he gained from his PhD studies and the recommendations he made in his thesis were being implemented in this project. He said:

So some of the ideas that I got from my PhD are actually being implemented on this particular project. But I think that Volta River Authority (VRA) should still psych the idea of still being on, for example, the white Volta board, the black Volta, even though it is Bui, still the downstream is so they should have a stake there. And they should have a stake in it (P21, 20:59).

Generally, interviewees who did not have any idea of the uptake of the recommendations and findings of their theses were researchers and consultants. Although they monitored the policy processes and other activities of government ministries and departments in their field, there was no evidence that their PhD studies were considered in these activities. They perceived government not to be interested in research, including their own theses. These researchers had worked on forestry, climate change and water resources during their PhD studies.

Interviewees who had seen some level of uptake of the findings and recommendations of their theses were working as researchers or academics and for government agencies. Although some could not link the uptake of the specific knowledge to their thesis work, they maintained that there was much public awareness in those fields after their PhD theses had been published. Other interviewees, like Jan, Zea and Thys, had been involved in the uptake of their recommendations. They had been involved in projects directly linked to their theses and had also been involved with government ministries and donor agencies regarding research and policy documents in areas linked directly to their PhDs.

Overall, the study established that interviewees only had knowledge of the uptake of their theses if they were involved in projects directly linked to their PhDs. In addition, the uptake of the thesis recommendations is not really linked to the professional field after the PhD, but rather lies in opportunities the researcher gets after PhD studies.

### **6.7.3 Researchers being in a position to suggest recommendations to government**

Most of the interviewees currently work in the public sector. They work in public universities, research institutions and government agencies. Governments turn to these institutions for advice when they make policy. The study therefore asked interviewees whether they had been in a position to suggest their recommendations to the government (including the ministries, departments and agencies).

Gert was a research scientist and a part-time lecturer at one of the public universities in Ghana at the time of the interview. When asked if he had been in a position to have used his recommendations to influence any government policy or make these recommendations to government, he mentioned:

Well yes. Let me say yes because at workshops I may point out one or two which I wouldn't say has influenced but at least it is a contribution that I make, a suggestion that I make (P7, 34:149).

To him, his duty was to make contributions and suggestions but the implementation did not lie with him. In addition, he met with government officials and other policymakers at workshops and had made these suggestions to them.

Danie shared similar views as Gert. He had met some government officials at workshops and seminars and had made some of his recommendations known to them through his presentations:

Yes, we've held several number of conferences and seminars where government ministers and government representatives have attended. I also work with one non-governmental organisation call the Institute of Green-growth Solutions. And we are a sort of advocacy for green-growth for natural resource governance, energy etc. so we have had a number of seminars and conferences where government representatives or ministers will be present (P11, 30:152).

At the time of the interviews, Zea was a consultant for one of the government agencies in her field and for the local government authority for the area where her university was based. She mentioned that since she had been developing policy documents for selected government institutions, she had made some of her recommendations known to them:

Yeah, because I developed a lot of background documents for projects for ministries, EPA. Currently, I'm doing something for the Forestry Commission on re-planting. These are all avenues that I have tried to add some of my recommendations and make it known to the government (P12, 20:137).

Although Thys worked for a government agency and was in a very good position to suggest his thesis recommendations to government for inclusion into policy, he would not do that because of "work place politics". He felt that he had made these recommendations again and again, but there no action had been taken.

I do but I haven't done that because of I will say work place politics, you know I know what. There have been a few times that I have made some suggestions and then unfortunately you

see I realised the people you are dealing with. When you get to a point where you feel a bit frustrated you just decided that “Well I have said enough ...” (P14, 26:92).

Zonja was a senior research scientist at the CSIR. She had several opportunities to meet the then sector minister to whom she suggested her thesis recommendations. She has also been involved in several workshops and projects after her PhD where she had made some of her thesis findings and recommendations known. She related:

There have been a number of opportunities. After the PhD, I met the sector minister once. But then going there was the first time I met her and then I mentioned some of these things to her. At that time, they were planning to do a zonation for aquaculture in Ghana, which is what I did in my chapter five. So it was like there’s already something there. So maybe what we can do is to just build up on it. We discussed a bit but then we couldn’t really go far with it. You know politics, change in government and all that. So that sort of ended there. But then I think years after, there was this World Bank facility which still wanted to do that and they needed people from the fisheries who have done that. So I was contacted. Well, there are a number of meetings that discuss that issue. Sometimes I have to represent the institute at meetings that are organised by the fisheries commission or the fisheries ministry whereby some of these issues have come up and then you make input based on some of the ideas that came out of the thesis. I think one technical thing that has come out for some time is the need for looking at the environmental aspect of the aquaculture. And apart from that too there is a technical committee at the EPA, the natural resources committee which doesn’t only deal with aquaculture but it deals with a number of other things but whenever the aquaculture issues come up there’s also an opportunity to make inputs (P15, 17:77).

She has had several opportunities at various levels to discuss issues in her field with key government officials and has made some inputs based on the knowledge she acquired during her PhD.

Although Anje worked for a government agency and had been in a position to make some of her thesis recommendations known to them, her challenge has been that at that stage, her position had no direct linkage with her PhD research and that made it difficult for her to make her thesis recommendations known to them:

But where I work currently, we work directly with the ministry of water resources, community water and sanitation agency, I work on a project but through community water and sanitation agency. My mother office is IRC but I have been placed here strategically so then it looks like I work for Community Water and Sanitation Agency. However, what I do now is very different from what I studied for my PhD (P16, 28:95).

Anje’s situation showed that if there is no linkage between the researcher’s PhD and the job

he or she does after PhD studies, such researcher would be dealing with a different set of stakeholders who would not be interested in the recommendations of the thesis because it would not be relevant for the field.

Nico, just like Anje, worked in a field not linked to what he studied for his PhD. However, after the PhD, he had participated in national forums which were linked directly to his PhD studies:

I participated in a workshop on ... prior to ... you know the national policy on waste management. I participated in ... I made recommendations as to how we can achieve results. But I'm not the type who impose my ideas. I just make it ... I threw a policy at the time I was Ghana's ... when I was at the ministry of environment I was Ghana's operational focal point for the global management facility. But solid waste management was not one of the issues that I had to deal with. So the people who were directly involved I've had discussions with them but as to whether I should have imposed or I should have been more forceful than that is another issue (P20, 16:57).

Similar to other interviewees discussed previously (see 7.5.2), Nico believed he could only make suggestions and thesis recommendations to those who make the policy, but cannot impose it on them for implementation.

The interviewees discussed so far in this subsection were consultants and mostly researchers with either a public university or the CSIR. All of them did their PhD studies abroad, except for Anje and Thys. They have had opportunities of meeting the sector minister, met some government representatives at workshops and forums and have been consultants on some government projects. They were adamant that the implementation or uptake of their thesis recommendations into policy should not be their responsibility, but rather that of the government officials they meet at workshops, conferences and different forums. The interviewees believed they could only discuss the knowledge they produced from their PhD research with government officials and at most produce documents for them.

However, two interviewees who had not been in a position to make their recommendations known to government shared similar views as those who had been in a position to make recommendations to government. Luan, who was teaching at a public university at the time of the interview and who did his PhD in Ghana, believed he could have made his recommendations known if he was involved in projects. He said:

I'm not in that position because like as I said the Bui reservoir or the EPA, they came up with a committee. I expected that having done a major work like this perhaps and even coming from academia they could have made me a member (P10, 33:87).

David, who was teaching at the same university as Luan at the time of this research, believed that even if given an opportunity, he could only discuss the knowledge gained and the recommendations he had made in his thesis. He said:

I can only suggest and so to implement would be very difficult. So I can only delve into the knowledge to discuss and help people to understand the concept and all that but to implement, really, I'm not in a position to ensure its uptake at whatever level (P17, 33:87).

He maintained that the real uptake of his recommendations lay with government. Government had to take up the knowledge and develop it into policy.

It is clear from the responses of the interviewees that they had not done much to get the knowledge produced by their studies to the end users. Uptake does not lie only with government, but also with the researcher. Mendizabal (2015) notes that not all ideas flow 'upwards' and to 'policymakers'. For most researchers, the most immediate audience is other researchers. Ideas take time to develop and researchers need to share them with their peers first. As they do so, preliminary ideas, findings, research methods, tools, etc. flow in both (or more directions). 'Uptake' therefore can very well be 'sidetake'. When researchers share with other researchers, they often use rather technical terms and formats, and so we should not mind it if they employ channels and tools not relevant to policymakers Mendizabal (2015).

#### **6.7.4 Thesis recommendation uptake to policy**

Interviewees were asked whether they thought the knowledge that PhD research generated in the field of ENRS in Ghana could be adopted into policy to help manage problems in the field. Interviewees were asked whether, if some of their recommendations were adopted, it could have helped their end users. The responses are presented below.

Anje:

I think so; I think so too. It could ... you know what I realised from the locals is that there's this missing link and there's also this ... they have lost faith with those at the top you know because people, they believe so much in them because they came with big! Big! Promises and at the end of the day they are not fulfilling them (P16, 23:83).

Lenny:

I believe even though, there is a bit of technology in it, those are the problems I governance not the engineering, not the technology, if you look at water, you will know that the water sector in Ghana the problem is not lack of engineers. But the problem is more of a political economy problem (P8, 7:23).

Luan:

Yes, I was doing something some time ago and the regional director of fisheries from BA, I

don't know how he had my number and called me that my work they've read and then we talked at length because as the regional director of fisheries he was taking up these things. And also recently they formed some management committee the Bui fisheries or something. They also contacted me and I gave my work out (P10, 27:80).

Kai:

Yes. But not to the general Ministry of Food and Agriculture (MOFA) guys. Since he is the boss there, you can easily transmit it to them. And the forestry commission as well. I also work together with them. And most of the things on seeds, I give them advice. Like we are doing a World Bank forestry investment programme in Ghana, in the western and Brong Ahafo region. It's a five-year programme being sponsored by the World Bank and one other agency. So I am playing a major part and my PhD work is helping in the handling of green seeds both at the lab and on the field. More so, that's why they are even helping us to set up two cold rooms at where we are now. Yeah, so I think my PhD is still very relevant (P18, 30:117).

Except for Anje, the interviewees above who were doing research, believed the findings from their theses research, which had been adopted have helped policy formulation. They maintained that because of their work they had been involved in government and international organisations and projects in the fields of their PhD theses. Their theses work had therefore been of help.

Thesis recommendations can be taken up if the author is involved in a project or policy activity. It is therefore recommended that PhD authors make their work known to key stakeholders in the field during and after the research has been undertaken.

#### **6.7.5 Further research recommendations uptake by postgraduate students**

Selected interviewees made recommendations for further research. The idea behind making those recommendations is, amongst other things, to ensure continuity in the field and, by extension, to help with the uptake of the knowledge generated. The selected interviewees in this subsection had supervised postgraduate students which the researchers thought was a good avenue to ensure uptake of their recommendations for further studies. Interviewees who had supervised postgraduate students after they had graduated themselves, were asked why they did or did not suggest their further studies recommendations to their postgraduate (PG) students. The responses are presented below.

Gert:

Normally I don't suggest topics to my students unless they ask for it. Just yesterday one of my students came to and said if I had some topics that I would suggest and that was the first time I was hearing anything like that (P7, 35:153).

David:

No, personally what I do is that I understand that people individually have got interest, where they want to work, where they don't want to work so when I have students I always encourage them to tease the system to find out what the problems are especially around their interested areas or wherever they find themselves and then together we find a way to go around it. It is not until someone has come to say that he's not having a problem which I doubt would really exist because I would always encourage you to find one. So till date I've not really recommended the further studies to anyone (P17, 28:134).

Gert and David had not suggested their findings to students because most of their students had their own areas of interest. Gert and David could therefore not impose their research recommendations onto the students. This also proves that there is a linkage between the topics in which they supervise students and the areas in which they specialised during their own PhDs.

Lenny had suggested some of his further research recommendations to his students, but at the time of this study, he was working with a student in South Africa who was interested in carrying out research based on Lenny's further research recommendations. He said:

Yeah definitely. One of my students, GA, and also AD from KNUST. He wanted to do something and I suggested it to him. There was a gentleman from one of the South African countries. We were having an exchange about how to go about his study (P2, 45:129).

Piet, who was a consultant at the time of the interview, had no postgraduate students to supervise. He planned to pursue the further recommendations from his thesis by doing more writing in that field and publishing his work. He also planned to take the further research recommendations into a post-doc programme. He said:

I have two papers now that are to go for review, going deeper into the same issues and revealing more spaces for research is one. Then also I'm developing a post-doc you know a proposal with UNU-INRA, I had spoken to them and other people to come and stay was it three months on that programme (P6, 31:82).

Kai had a PG student who had used one of Kai's further recommendations for his PG studies. Kai's thesis recommendation was also guiding the student during his research. Kai said:

Yes. The student selected a topic based on my further recommendation. And he's using some work I did in my PhD to help him to his fieldwork. And most of the germination work he is doing, he is using some recommendations from my PhD thesis (P18, 31:123).

Nigel has had PG students whose research areas were based on the further recommendations in his thesis. The students were working in the same field as Nigel. He has already had a

sizeable number of PG students who were working in his field. Nigel said:

At the master's level, a few of them have done research similar to what I did. Currently, I'm supervising one person, a student who is also looking at the WA side; also irrigation. One of them, it was doing my PhD that I suggested a topic for him. And AKK's work on irrigation mapping. That was one. Then one is also looking at irrigation related and resource works. Then Kwabena looked at small reservoirs. I helped supervised that. And then aside home I think I had another two people (P21, 25:71).

Jan was a research scientist with CSIR at the time of this study. He was ensuring the uptake of his further recommendations through current projects he was running and the supervision of PG students:

After my research interest and projects in the field has springing up after I did my studies some of them I had the opportunity to quietly supervise some of the studies and projects. Now there is one big project called the bridge project I think it's in phase 2 but three years ago we also had the glove future project on ground water which I was running so it's also a follow up on that and they were also looking on to recharge as well as assessing the volume of the ground water which is available in certain portions of the Northern region. I have a master student from KNUST who has submitted his work for a review also looking at recharge verses abstraction within some part of the north looking at groundwater recharge sufficient, present and future demand scenarios (P3, 25: 43).

To Lenny, his PhD work was not the pure engineering he was teaching at the time of the interviews. Therefore, his PG students were not interested in his further research recommendations. He said:

So far I have not had any students who is keen in that area. What is happening I see some people have shown interest but I think of doing that with somebody in planning, because I will think very well because over here if you are coming to do master we prefer you have engineering background (P8, 33:152).

Janco tried his utmost to let his students undertake research in areas which they were interested. He said:

Incidentally, I try as much as possible to let students do what they want to do. Most of the students come with an agenda or a proposal so at times it's kind of difficult to switch them. But some of them I'm using other people, probably students I've use some few undergraduate students but how they collect their data ... just to develop their technical skills. I'm actually trying to work on a proposal for some of those recommendations if I get funding I can do a good job (P9, 17:68)

Luan, who lectured at a public university in Ghana at the time of this research, had not



recommended the further research recommendations in his thesis to his PG students because his university had not yet started a PG programme in his field at that stage. He said:

The further studies recommendation, our graduate programme for this faculty is with the national council for tertiary education so once it is approved and it goes for accreditation, if I were having graduate students today I could have recommended the topics to them (P10, 34:96).

Zea did not recommend the further recommendations from her thesis to her students directly, but rather discussed it with them indirectly. She said:

No, not directly. I don't recommend directly my further recommendations directly to my students. Sometime you don't sit down and lecture the person in a classroom but can also have discussions with them when they need your services and come around. There are so many informal ways of communicating some of these findings.

But then most of the student have their own issues and mostly common with topics that interest them. In addition, to give a student a topic it comes with funding. Most of them come with their own ideas of what they want to do. We have students from all across the disciplines; some are into environmental chemistry, environmental physics, and environmental law so you have to get somebody who is also interested in my background or PhD research field (P12, 24:151).

Most of the PGs she supervised had their own interests. It was therefore difficult to suggest her recommendations for further research to them. In addition, the field was broad whilst her thesis focused on a limited area.

The findings from our interviews reveals a mixed situation. There seems to have been some degree of uptake of research recommendations with those interviewees who worked as researchers and academics. However, there were also interviewees who had not made any efforts to let their PG students work on the further research recommendations from the original thesis.

Lukmann (1983) notes in his article "Common sense, science and the specialization of knowledge" that science is a form of special knowledge and it is also a specialised work discipline. Based on the notion of science specialisation, interviewees need to supervise students in the field of the original PhD, especially during the early years after obtaining the PhD. This will help the interviewees to ensure some uptake of their recommendations and will also help them to specialise in the field.

## 6.8 Monitoring of citations from authors' publications

In the present study, we also investigated what interviewees know about the use of citation databases. In addition, it was investigated whether they monitored citations from their publications and further, enquiries were made about which databases they mostly used to monitor their citations. The questions were used to find out whether interviewees were monitoring their publications and whether they were aware of the journals that were cited in these databases. Above all, this is a method to assess the impact and uptake of one's publications.

### 6.8.1 Knowledge of citation database

Having a level of knowledge of a citation database alerts one to which journals are well recognised and also where to publish. When the interviewees were asked about their knowledge of Scopus, Web of Science (WoS) and Google Scholar, the following were their responses:

Willem:

I never knew of web of science (P2, 82:240).

Samuel:

No I don't know of Web of Science, Scopus or Google Scholar! But then, what is the benefit of that to me? (P5, 35:135).

Piet:

I don't know of Scopus (P6, 57:154).

Thys:

No, I haven't heard of the Web of Science before (P14, 51:182).

Anje:

no, I haven't heard of the Web of Science before (P16: 45,215)

Kai:

I don't know of them. For now, I think I will start going to Google Scholar. I have been told (P19, 41:256).

The interviewees above were in the research and government agencies, except for Willem who was with an academic institution. In addition, all of the interviewees above, except for Willem, studied in Ghana for their PhDs. In most Ghanaian universities, it is clear that access to online library resources is a challenge, and that reflected on interviewees not having knowledge about citation databases.

However, the respondents below had knowledge of selected citation databases. Most of the interviewees studied for their PhDs abroad.

Harrie:

Yes, I know Scopus, I knew from South Africa and also know the Web of Science (P1, 60:164).

Willem:

I think I have heard of Scopus (P2, 81:240).

Piet:

Yeah. I don't go to the Web of Science, but I know it (P6, 58:156).

Lenny:

I know Scopus; I know the Web of Science (P8, 54:261).

Janco:

In fact, I do know Google Scholar but I actually started probably a year ago. I know it's an indexing facility but not really using it. I mean Scopus. I've heard about Web of Science but having bothered myself to know what that is (P9, 39:130).

Luan:

I'm on Google Scholar. My younger brother was studying in Sweden for a PhD. He was the first person who gave me the link and I registered. I know of Scopus too (P10, 48:136).

Ruan:

Yes, I know Scopus, but I don't even use it. I also know Google Scholar (P13, 48:183).

Thys:

Yes, I have heard of Scopus, but not sure what it is. Yes, I have heard of Google Scholar (P14: 52,184)

Anje:

yes, I've heard of Scopus, which people use for review, references and so on (P16, 46:176).

David:

I know Scopus and the Web of Science. I know that they are entities that are able to help to keep the publication of scientific papers and all in the right perspective and they do a number of things to help to maintain that status (P18, 52:220).

Kai:

Yes, I know Scopus. Yeah, Web of Science. But I have never used it (P18, 53:233).

The interviewees who had knowledge of citation databases heard of them mainly from universities abroad. Interviewees who undertook their PhD studies in Ghana, but had knowledge of Scopus and WoS, were the ones who undertook some part of their PhD studies abroad for some months. In addition, most of the interviewees had knowledge of Google Scholar and a fair knowledge of Scopus. Most of the interviewees had no knowledge of the Web of Science. Those who had a fair knowledge of Scopus did not know what the databases were used for or even how to use it.

### 6.8.2 Source of citation monitoring

Interviewees who had a fair knowledge of citation databases were then asked how they monitored citations from their publications. Most of the interviewees used Google Scholar as presented in their responses below.

Willem:

I do it with Google Scholar (P2, 100:236).

Piet:

I just go to Google and just type it then you can see one or two (P6:56,151).

Ben:

I monitor my citations through the research gates (P19, 42:254).

Other interviewees also used research gates to monitor their citations. During the study, it was also investigated why other interviewees, although they had knowledge about citation databases, did not monitor citations from their publications.

Zonja, who was a research scientist at the CSIR, noted that it was because she felt she had not published much. She said:

Generally, well that's my personal thing, I feel I haven't done very well at publications. So what I'm trying to do is to slow down a bit on taking on new projects and then being able to publish because I have a lot of data that I can publish. So it's one thing I am really considering. And then I'm going to hold on with applying for new funding and then work on those things and get a number of publications out before I pursue further consultancies (P15, 60:254).

Overall, interviewees, no matter their professional background or knowledge of citation databases, did not see it as important to monitor citations from their PhDs. They had little understanding of the importance of citations for their professional careers and the visibility of their institutions.

## 6.9 Research (recommendations) uptake towards policy and practice

This section presents methods that interviewees tried to use to get the findings of their PhD research to relevant stakeholders including policy makers.

### 6.9.1 Method of ensuring uptake by interviewees

Interviewees were asked about their overall views on the uptake of their theses findings into either policy, or practice or both. This was done to find out how they were making efforts,

formally and informally, to increase the uptake of the knowledge they produced from their PhDs. Here are the responses from the interviews.

Harrie:

Yes. Anytime we doing anything that is related we talk about it. Here we work with the Community Water and Sanitation Agency so when we have time to discuss issues we have done a lot of projects with them, we go to their office we share some of these things with them. A few of them come around, not directly but there was one guy, one of our professors in South Africa had a student doing a research. I think it was related to water etc. so that's the only one that I have directly contacted, apart from that a friend of mine works there still in South Africa sends once in a while his students, master's students basically. I don't supervise them, but they send their thesis to be reviewed. Most of the work in my thesis, we do the same here, so I have it here. I wouldn't know how many times because we keep doing a lot of technical report here. Normally, what I try to do, some of my colleagues find it very useful because always if they come and they want you to explain something you give them for them to go and read (P1, 16:38).

Samuel worked for an NGO before graduating. He was ensuring uptake of the knowledge from his PhD through consultation with students and other colleagues. Samuel said:

Then the one at the University of Ghana now, she is just finishing her MPhil. She did something on Sustainability of Development Projects in Southern Ghana. Then this other guy is also doing his, Kofi. He is writing on the Impact of Literacy in Development or something. We had a major literacy programme in the Water Project which I managed, that one too he was consulting me (P5, 5:7).

Piet:

I have recommended it. In informal discussions and lecturers also recommend it to students. But of course it is the publications that I think is effective. Yes. In fact, one Dutch woman has almost finished my thesis. She is quoting here, she is quoting there, she is just cutting it and pasting and then analysing it. So when I read the work, when she was finished she got an actually I was so impressed. Because I took her to all the field work and edited the chapters as well. Come on. Did you do a literature review or you did a field work. Anyway (P6, 7:36).

Gert:

Yes. I speak to my students about my thesis and informally amongst my colleagues (P7, 10:48).

Lenny:

So for me, I even find it difficult to draw the line to which of the PhD and which is not for the PhD because I seem to be working for the continuity, continuous (P8, 28:115).

At the time of the interviews, Lenny was a lecturer at a public university in Ghana. He was encouraging the uptake of his work through policy dialogue with stakeholders:

So this what the policy states and this what we found, stake-holders what do we do? So it will

generate into discussions. We shared it by email. We also printed them some of them hard copy, as I said the programme was well resourced, we could print and make it available for free, we had good editors (P8, 41:192)

Janco worked at the same university as Lenny but in a different faculty. He was encouraging some uptake of his findings through interactions with farmers. Janco said:

Yes, since I finished I've been involved in research, teaching and extension. Extension because we do a lot of projects where we link up with farmers so I've talked to hundreds of farmers giving these recommendations and I believe some have adopted some of the recommendations. I won't be able to pinpoint to say this or that person and others who have adopted the on-farm recommendations but I've spoken to a lot of farmers (P9, 14:60).

Danie lectured at a private university which focused mainly on business-related courses. He taught from his thesis:

No not the students but I think, I made a presentation to the faculty not the students. Some of the students were not there so it was an interaction with the faculty. I teach and most of my lecture notes, I use some of my literature review from my PhD. I think I've given out some aspects of what needs to be carried out to some of the students. The Africa Institute of Sanitation and Waste on Management (AISWM) for Zoomlion Company and affiliated to KNUST. I teach master's students. One of them is writing on a topic I gave out (P11, 12:55).

During his PhD, Zea's Ghanaian supervisor used some findings from her thesis to make presentations at workshops and also in developing proposals. In addition, she was using some of the recommendations in her thesis in her presentations at conferences and also in teaching masters' students. In addition, she also wanted to develop some part of the work into policy briefs. Zea said:

And the first recommendation was one of the key things taken up, making sure that we develop the policy because the institute was part of it and when you read Professor Gordon book, another colleague, and Dr MX. So it was quite over a long period of time, the consultation took a long time. You know just because we wanted to get as many stakeholders as possible to be involved in the policy process. So the first one is still relevant and there has being some uptake when you look at the implementation planning and all that, it's also been very consultative making sure that there are a lot of stakeholders at the ground level; the local level been involved. Because it's important to have policymakers buying into all that. The second one is still relevant but it's still an issue. I remember in one of the presentations even Professor XG took some part of my thesis and inserted it into his presentation. Because there was a table inside that look at people's access to knowledge and modes of acquiring knowledge; through television, radio whatever. I mean these are things that people know (P12, 17:122).

Ruan was a research scientist at the CSIR. She distributed copies of her thesis to selected institutional universities to ensure a good uptake. Ruan said:

Well I've been distributing my thesis. Because for us our thesis we publish it like a book. I did about 250 copies. I've distributed a lot so it's in people's libraries and others. Just three days ago I was just looking at my plan and I was like no I have to do it because I intended to write a policy brief and so that is something that for example I'm going to do (P13, 11:48).

Thys worked for a government agency in his field at the time of the interviews. He discussed his thesis findings informally with his colleagues and his park managers. Thys said:

Informally like, at maybe you meet colleagues or students. But informally, you should note that where I did my Project happens to be one of the protected areas under mine jurisdiction. Yes, so I'm dealing with the Park Manager every almost every time. So informally you know, drawing his attention to some of the issues (P14, 14:44).

Zonja was ensuring the uptake of the knowledge from her thesis through discussions at conferences, workshops and other forums. In addition, she used some recommendations for her consultancies and recommended her thesis as reference material for her PG students. Zonja said:

Yes. Well there are a number of meetings that discuss that issue. Sometimes I have to represent the institute at meetings that are organised by the fisheries commission or the fisheries ministry whereby some of these issues have come up and then you make input based on some of the ideas that came out of the thesis. I think one technical thing that has come out for some time is the need for looking at the environmental aspect of the aquaculture. And apart from that too there is a technical committee at the EPA, the natural resources committee which doesn't only deal with aquaculture but it deals with a number of other things but whenever the aquaculture issues come up there's also an opportunity to make inputs. Well the very first recommendation is being implemented now. And I am doing that under the World Bank project. Well when I came back from my PhD it's one of the things I talked about a lot at a number of conferences and meetings, the need for it to be done. And I did an initial study. One of the proposals I wrote when I came back was based on the first recommendation which we got support for from the royal society in U.K. So we had as part of the programme we wanted to create awareness. So we had workshops and invited the stakeholders and put issues across to them. So when there was the opportunity for something to be done, the fisheries also included some of these things in the work that the government was taking a loan for from the World Bank. And so it is being done now because we even have a presentation at a workshop next week. I have to make a presentation on the 1st of April, to present some of the findings that we've come up with at the Ministry of fisheries I am the consultant for it. But then when it comes to workshops I just tell them where to present and they will organise the venue and all

that. Sometimes, normally when I supervise students most of these don't have literature. You realise that from their citations they cite like one paper ten to fifteen times. So I have a lot of publications that I put together so I give it to the students and that includes my PhD work (P15, 24:103).

David was a lecturer at a public university where Luan also lectured. David developed concepts linked to his thesis findings. In addition, he discussed his findings at workshops and other forums whenever he had the opportunity. He also wanted to put some more publications out which were linked to his thesis. David said:

on campus for instance, I've always been coming up with the concepts and ideas of further studies into that. Most colleagues would always say the fireman because it appears as if everything fire I want to be interested in it. Not only that, in scope on radios, TV stations and others we normally have discussions of the sort and these things come in once a while. for instance, when you're talking about today, the issue of fire came in because the IWMI people, they wanted to promote mulching using leaves but you can't mulch at a time when you don't even have any plant can you? it hasn't been as I would expect or as I would have loved to due to the strings that exist in the society so for uptake I'd say on a scale of 1–10 where one is the least I'll say four (P17,14:60).

Kai's thesis recommendations have guided him in his consultancy work. He also believed there has been a good uptake in one subfield related to his thesis recommendations. Kai said:

Was it two years ago, the UN engaged me and some other scientist all over the world to assemble at The Hague. We had to do some work on the international movement of seed. So some of these recommendations were used to guide me. On a scale of one to ten I will say, let's say eight to the utilisation of my findings and recommendation. Concerning afforestation programme in Ghana I will say eight. Because more or less I am in charge of the seed centre. And we are taking a lot of seeds out every year. COCOBOD is buying a lot of seeds because they are planting a lot of economic trees on cocoa farms. So we are all over the place (P18, 25:100).

Ben, who is a director of an institution within his university, thought there had not been satisfactory uptake of his findings. He had used his thesis recommendation in just one project which needed the recommendation. He planned to develop a proposal to seek for funding to use his findings and recommendations to train more PhD students. Ben said:

For now, I wouldn't say yes formally or officially. But I took it as well in the first place when I finished, through this ongoing project ... in fact, it ended in 2014. Cocoa, we had what we call step cites. Cocoa area where I did my work became one of the step cites. So we were meeting and I was making inputs. In fact, I even ... I have led in writing abstracts of pollination. Then I have also contributed to writing of handbooks. And these things are all in prints. Very soon they



will all come out: the book of abstracts, the cocoa handbooks. All those things are all coming out. So for the uptake aspect, we were handling this (pharma) school [words spoken are faint I could not hear them]. So that is more on the applied side. That is where I look at as an uptake. So what I really see is that if I could come up with a proposal where I could get a PhD student or even a master student to do some of these things, we could still do it and then we could continue the research uptake in terms of sending information to farmers and that could be a major thing. So that is how I am seeing it. I will say that not to my satisfaction of the utilisation of his recommendation. Because it's like after the farmer school thing we are doing, we haven't made much (P19, 144:236).

Nico was a consultant with a government ministry, who had worked in a different field than his PhD since graduation. He felt there had been poor uptake of his findings and recommendations. Nico said:

On a scale of one to ten ... I think the uptake has been poor. The point is if the policy recommendations I made, if those were accepted and implemented, we wouldn't be here. Sometimes ten years down the lane we'll still be mentioning the same thing (P20, 29:137).

Nigel was a lecturer at a newly established public university. He was using his findings and recommendations in his teaching and consultancy jobs. Nigel said:

Exactly. I teach master's in water resources. I teach river basin management. I teach water resource planning. I teach integrated water resource management at KNUST. And then I teach water resource engineering, graduate studies at the University of Energy. And then at the WASCAL<sup>14</sup> programme in Niger, I teach hydro-power engineering and then I teach energy system planning also. So in all my courses I bring in my PhD. As for my university which is so young we have just started graduate school. So we need to design such a system. But what I know is that for example for Legon they left the student go on one-year industrial internship based on there you create the relationship then you could even get your research thesis from there. What this is actually doing is that we are sponsoring over 23 students; master's and PhD and their research work is being added to the project which would become a policy to be given to stakeholders (P21, 7:20).

### 6.9.2 Institutional methods of research uptake

For reporting in this subsection, interviewees were asked whether their respective institutions had a policy or a specified procedure to encourage the uptake of various research findings, including theses produced by the staff of the institution. The responses from interviewees are

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<sup>14</sup> WASCAL (West African Science Service Center on Climate Change and Adapted Land Use) is a large-scale research-focused Climate Service Center designed to help tackle this challenge and thereby enhance the resilience of human and environmental systems to climate change and increased variability

presented below.

Harrie worked at the CSIR. He said:

I don't think that this is something that we have (P1, 68:178).

Lenny was a senior lecturer at one of the public universities in Ghana. Lenny said:

Not really. It's me who is following up myself. I have had a lot of interactions with policymakers. Water resources commission and the government itself. I have written some policy briefs (P2, 39:113).

Gert worked at the CSIR and in the same institution as Harrie. Gert said:

to some extent yes, CSIR have a mechanism for uptake (P7, 60:255).

Lenny worked at a public university in Ghana. Lenny said:

What we have is our college research retreat and we invite practitioners or industries to present the findings (P8, 59:276).

Janco worked as an academic in the same university as Lenny. Janco said:

I think now KNUST has a D-SPACE<sup>15</sup> where all MSc and PhD theses are supposed to be deposited. Apart from that I don't know. Occasionally we organise seminars and workshops for graduate students to present (P9, 45:151).

Luan worked at a public university in Ghana. Luan said:

The library has come up with some plans. Now they have institutional repository. They've encouraged us to send all our articles to them for them to post it (P10, 70:212).

Zea lectured and did research at one of the public universities in Ghana. Zea said:

The major uptake is by publishing. In addition, when we have conferences, we encourage our students to do poster presentations (P12, 64:310).

Ruan worked at the CSIR. Ruan said:

We have a little bit of that. It used to be a bit weak but now we are trying to improve on that. That is why they have the seminars. So we are talking about all science policy interchanges and all of that but I mean it all comes down to now all of us being encouraged to do policy briefs and technical notes and all those things and then trying to make our presentations in the different conferences. I mean that is the way for us that is the way we disseminate is to do the normal journal papers, do the technical reports, do the policy briefs, present at conferences and sometimes write extension materials like manuals. So for us that's really the way to do it (P13, 53:199).

Thys was a senior management official with a government agency. Thys said:

There isn't any laid down procedure. It's usually at the discretion of who is in charge. He decides whether this is interesting to send it out for people to read (P14, 57:193).

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<sup>15</sup> Online search engine for searching for thesis from KNUST

Zonja works at the CSIR. She said:

No CSIR has no mechanism for uptake of research findings. It's entirely dependent on whoever is working (P15, 27:113).

Kai works with Zonja in the same institution of CSIR. Kai said:

The requirement is that after your PhD you need to take a copy of your thesis to the library. So a copy is supposed to be there. Then apart from that we don't send it anywhere. That's why KNUST they even float it on the internet for people to have access to it (P18, 24:95).

Ben was a director of a consultancy centre at one of the public universities in Ghana. Ben said:

Yes. In fact, through the DRUSAG project, the institution use to have policy it used to be there but it wasn't really defined and it wasn't properly explained (P19, 44:262).

The responses in this subsection are from interviewees who worked as academics and researchers. Their responses show that research institutions and universities do not have any laid down procedure for the uptake of research from their staff. Institutions mainly disseminate their findings periodically through workshops and conferences. In addition, there is little communication of institutions' findings to stakeholders. Overall, institutions do not encourage and ensure that the findings of their research are available for the use of stakeholders in the field.

### **6.10 Views on maximising research uptake in the field of ENRS**

Interviewees were asked how stakeholders and experts in the field of ENRS maximise the uptake of research findings in their fields. Interviewees suggested the best ways which, in their views, will help maximise the uptake of research findings. Their suggestions were grouped into broad areas as follows:

- create appropriate platforms for the dissemination of research findings;
- involve governments in research;
- create involvement of development partners;
- make research findings practical and relevant to developmental challenges; and
- make publications clear to end users.

The above broad suggestions are discussed in detail below.

### 6.10.1 Create appropriate platforms for the dissemination of research findings

Interviewees suggested that to maximise the use of research findings, there is a need for research institutions and other stakeholders to create appropriate platforms for the dissemination of research outcomes and outputs. These platforms should bring together stakeholders to share ideas and could take the form of seminars and workshops.

Zea, who was an academic at one of the public universities at the time of this study, responded that the policymakers with whom she engaged believed a platform was needed to translate research into policy. Zea said:

There was a lecture and during the open discussions this same issue came up; the fact that there is so much knowledge being produced and yet you don't see it being translated into policies. You don't see evidence based policy being taken up. You also don't see uptake of knowledge produced at the local level. The people at the local and policy level are not getting access to these knowledges we are churning at, even when Dr Okoe Vanderpuye (the mayor for Accra) came for one of the lecturers he also said the same thing (P12, 14:110).

Thys mentioned that the research at the university should first get out for people to use. The findings should not only be academic, but also simple for people to use. In addition, he mentioned that universities should create the appropriate platforms (forums) for people to discuss the findings and also use them. Thys said:

I think that maybe the universities can't do that it is something that they have looked at it seriously. You know I don't see and really publishing is not you know a lot of this scientific papers are not put out but they are always within the academia. They are not read by people who will use it to do something. They should get their publications out there for people to use. Those ones never get to the real people so I think that the universities could create another forum where they would take their time not just about the Natural Sciences. Even in other fields when interesting or very useful issues come out like ... they should have another forum where they can broadcast the findings. Yeah so all that I'm saying is that you know they have a bigger forum where if there were issues they can take them out through the policy arena. I haven't seen that conscious effort by the universities to do that (P14, 45:160).

Zonja noted that to maximise uptake, stakeholders should communicate their findings by making them available to users. The above can be done by creating a platform for people to know what the findings are. Zonja said:

It's all about communication. Being able to make the findings available to people. Let people know about it because usually when you come in and it's just put on the shelf nobody will know

what is in there and there's no way anybody can use it. So it's all about letting people know what you have done and then being able to take it up (P15, 54:236).

Anje mentioned that platforms should be the first thing stakeholders need to look out for before even starting a research project. To her, these platforms needed to be involved in the research so that the findings of the research could be communicated easily to the platforms. Anje said:

If we are doing research let's look at the platforms that are available at the local level, how well we can get them involved, how well can we bring them on board and then make our recommendations to them. Perhaps if there are other ones at the regional level too, we can also explore the RCC for instance the Regional Coordinating Council. You see some of these things they don't come free (P16, 43:160).

Ben, an academic at a public university, mentioned that researchers are just agents. To maximise the uptake of their findings they need to form associations with the main collaborators and by extension can ensure some uptake of the research findings. Ben said:

We are just agents. But if I will ... because you have the job and you have your cash, give me something to do something for you. Everything is for you. So I think for now researchers must go straight to identifiable bodies and work with them. And that's what I personally believe. Even with the bee keeping, I'm dealing mainly with the bee keepers association to get the work done (P19, 39:243).

The above respondents were researchers and academics, with one person working for a government agency. They suggested that to maximise research uptake, platforms that aid communication need to be created. These platforms should be established even before research starts. The platforms could include forums, associations and collaborations that would facilitate discussions about the research findings and by extension maximise the use of research findings.

### **6.10.2 Involve government in research**

The interviewees believed government played a key role in the translation of research findings into policy, thereby ensuring some uptake. They mentioned that collaboration between government and stakeholders in the field of research should be strengthened to aid the utilisation of research findings.

Jan, who was a research scientist and had been involved in much knowledge exchange forums after his PhD, mentioned that to maximise the uptake of research findings, there should be collaboration between relevant research institutions and government institutions. Jan said:

So it has to be done in collaboration with the relevant institution or agency that can use that,

even if it is purely academic like a master's or PhD work it is still important if, for instance, you make your study known to these important agencies. I am doing this work and when it is done it can be used for in this manner and then perhaps by some comments or advice they give it can have shaped your work and make it such that they can actually make use of it. But if it is in a project that you are doing and you need to go beyond that and actually involve the relevant stakeholders as much as you can if there is a platform where you can bring them in to shape your project objectives or help to outline it (P3, 49:97).

Jan mentioned that, if these institutions collaborated appropriately with the government and in good time, it could help stakeholders to give input into the work and use the findings after the study had been completed.

Samuel thought that, if networks were strengthened to include policymakers, research uptake could be maximised and the research findings be translated into policy and be made practical for users. Samuel said:

It comes back to what you said about the networking and then policymakers in getting to know of relevance for them in their work, you see and then they can pick it up and then use it practically  
(P5, 30:124).

Gert worked at the CSIR and mentioned that the governance structure in Ghana should have a place for research utilisation. This structure for research will see specialists in the field coming together with policymakers to find ways to maximise the findings from research. Gert said:

I would have expected is that the governance structures in my country should have had a place where they have a national specialist group that are consulted to make inputs in certain national assignments relating to that. So purely what I looked at is how I put my expertise into practice to serve as a means for my own livelihood. And we're talking about international institutions like your institution UNU-INRA that was why I was working with UNU-INRA for example. And other private consultancies and teaching like in the universities and stuff like that to impart some knowledge (P7:52,232)

Lenny mentioned that the fact that one has research findings that are promising does not mean there will be some level of uptake. He responded that there was a need for institutions within government institutions to strengthen collaboration amongst themselves on the best ways to market the research findings. He said:

The fact that research is promising means that it can ever get to scale. You see if you take KNUST here, fortunately we have a business school, we must work together, so that once you finish in your science aspect with your engineering aspect then they need to look at the business

aspect if it makes business sense, without that we will be wasting our time. Unfortunately, that's the only thing, because the research should produce findings which will help us improve the way we do things and I think there is a lot of room, there is a lot of room and also there are time will think when you have a good research people should come and beg, you need to have some clear activities to take it to scale (P8, 50:245).

David, who was a lecturer at a public university in Ghana, held a different view from the interviewees above. He mentioned that strengthening collaboration with government and policymakers would not change the way they viewed research outcomes. He suggested that there should rather be more capacity building to change the policymakers' view on research.

to maximise it really, from the area that we are in I don't think direct policy formulation and policy change and all these things. I think building capacity helps, see at least if you're not able to change it in the temporal, in the short while, in the long term the psyching that we give to the students could eventually result into change. That is more sustainable and more reflective of what we can do. Mostly, the politics we have in the system do not permit us to change things as it stands but then building it into the people that are coming to take positions would actually help solve the problem. The challenges are that problems are numerous you see and it's not everything that may be uptake. Some would require sometime even for the system to identify that problem before that solution could be used. So I think currently knowledge building by itself is better than it used to be. The uptake component has nothing to do with inability of the person who did it to promote it but once it's a knowledge that has been generated it would be better to use in the future in time to come (P17, 47:218).

Luan mentioned that, if government was involved by making available funds for further studies based on the recommendations amongst others, it would aid the use and uptake of the research findings. To him, collaboration with government should include possible funding for the uptake process. Luan said:

One of my major reason why I recommended for further research because every study you cannot do everything. So once you finish and there are recommendations. If as government plans a research fund something available so that immediately people will have the funding to be able to continue. For research, even transport to the area alone, is not easy (P10, 58:176).

The interviewees in this subsection were academics and researchers. They suggested that strengthening collaboration between research institutions and government could maximise the utilisation and uptake of research findings. The collaboration should mean that government is involved right from the formulation of the research, through to the end and use of the findings. In addition, there is a need to strengthen collaboration amongst the various relevant government institutions to aid the utilisation and uptake of findings. Policymakers capacity should be built and their perception needs to change toward research and the way to use

research findings.

### 6.10.3 Create involvement of development partners

In order to maximise the use and uptake of research outcomes and outputs, interviewees felt that the private sector should be involved actively in the entire research process. They maintained that the private sector has the needed funds and logistics and also needs the research findings for their activities.

David identified the donor community as part of the private sector. He mentioned that these donors only request researchers to produce knowledge, but do not ensure there is a means of promoting the use of the knowledge. David said:

Mostly in collaboration with donor agencies and all that we once a while are asked to give out knowledge that we've developed that we deem necessary to be used by any other people. So there's a mechanism but it is not as regular as you would want it and even if it is there I mean if the knowledge is developed and there's no means to promote it I mean it still goes back to ground zero (P17, 54:244).

Kai mentioned that the private sector should work closely with research institutions to ensure uptake. To him, the private sector was mostly the end user of the knowledge products developed by the research institutions. The private sector also has the money to transmit the technology developed to the end users. Kai said:

If the private sector will come in, mostly, the private sector should work closely with research institutions. So if the private sector could be encouraged to work closely with research institutes they will take up. Because we do research but we look out for them to use it and develop products. So if they can come in ... they have the money. They can take the technology and develop and it can go far. I will not mention government because government is not serious. As for research, government, it's almost zero. They are never serious (P18, 47:189).

Kai thought that government is not serious about research and its utilisation. He therefore did not even want to mention government in these processes. He maintained that the private sector holds the key to maximise research use.

Nigel suggested that strengthening collaboration between researchers and government would be the best. However, he maintained that embedding the private sector into the process would help to aid the whole process of research utilisation. Nigel said:

When we get the opportunity to collaborate with the policymakers, collaborate with government organisation it's the best. Private sector, if only it would be embedded. If it cannot be embedded then it not really going to push, because you need government. I have a lot of good relations



with Ministry of Energy. Especially, the renewable energy directorate, we do a lot thing together and once I reach there the director, “hey”, let’s begin to think of new things. You see and that is what I think is changing things (P21, 44:146).

In addition, he mentioned that to maximise uptake there is a need for researchers to think of new things needed for development. He believed researching into new areas would ensure a change in the way research is utilised.

Ruan believed researchers and their institutions need to put in a lot of effort to get their findings to industry. She mentioned that to reach out to industry there is a need for researchers to develop their research findings into policy briefs and technical notes. These research outputs would help the findings reach out to industry. Ruan said:

That has not been our culture. In that sense you have to put in a lot of effort in reaching out to the people in the industry. I mean you just have to reach out to them and so scientists, we should be interested in giving policy briefs maybe technical notes. For example, I should have done for example a two-page policy brief and when I actually returned the CSIR asked me to bring my work plan of how I intend to disseminate my results. I sent a reply but I haven’t really been able to follow through. We need to reach; we have to just reach out to the place (P13, 42:160).

Interviewees in this subsection were all academics and researchers in the fields of forestry, soil management and bee keeping. They identified the private sector to include the donor community, industry and other individual users of their knowledge products. They suggested that the private sector holds the key to ensuring uptake of research findings since they use the findings and need the findings for their activities. In addition, the private sector has the funds needed to ensure technologies are developed and other knowledge products are made known to the general users. Finally, they suggested that knowledge should be developed into policy briefs and technical notes.

#### **6.10.4 Make research findings practical and relevant to developmental challenges**

Interviewees suggested that to maximise the use and uptake of research findings, there is a need, amongst other things, to make the research and its findings practical. In addition, the research should be relevant to the current challenges of the end users of the knowledge produced:

Willem:

Practicalise whatever you do ... because when you do your PhD you have some techniques and skills that you bring to the fore (P2, 96:220).

Jan:

I think first of all; the research they are doing must be very relevant to the challenges of the

area or the field they are doing the research because research shouldn't be done for research sake. It should address pressing issues or they are contributing the fundamentals for someone else to build on to deliver something. So once the subject is relevant in that regard that by itself when it is done can promote itself once it is published or put in a domain where it has to be (P3, 48:97).

Ruan:

We have to be able to engage these policymakers really a lot. I mean, I think that we as a country for example like in Ghana we have a specific problem and the problem is that generally in this country we are not people who would want to take up research findings to do anything. That has not been our culture (P13, 41:160).

Zea:

Practicalise this particular recommendation too. Because the reality is that translating it into Twi (the major local language) can help since not everybody can read the recommendations in English (P12, 15:114).

The interviewees in this subsection who were academics and researchers believed that, if research is designed to find solutions to the developmental challenges of the country, the uptake and use of the findings would be easier. Practicalising the recommendations should also include translating them into a local language. In addition, if research is relevant and meet developmental challenges, it will bring stakeholders on board for easy uptake of the findings.

### **6.10.5 Make publications clear to end users**

Interviewees reported on in this section noted that the key outputs of research are the publications that are produced from the findings of the research. These publications should be made very clear and simple enough for users to find it relevant and useful. They suggest, amongst other things, that the abstracts of publications should be clear and concise. In addition, the findings of the research should be developed into a two- or three-page policy brief for policymakers and other users.

Samuel:

The best way is always to publish from them, any opportunity you get you pick a few things that they did, add them some of the experiences, their current we are doing. It doesn't necessarily have to be the journal, it can even be a newspaper articles (P1, 56:153).

Piet:

If you look at in terms of output and getting it out, I think the best way is to reduce the length of articles and getting the abstracts to be clearer than being dense. But from the output, of course the length of the article is in question as well, I think we need to get to a time that these things need to come down. You see an article 10 000 words, come on, it is too much. 8 000 words is

even a problem for me. But there are some articles for example in world development, very high, you see just about 5 000, 6 000 and it is good, it is very thick and you enjoy reading it because 6 000 words is fine. People should have received a simplified version either at the conclusion or a simplified version of the article for practical development work. So is it possible journals or a particular journal can be there, we call development work that people can provide summarised versions tailoring it just for the development work. Just that alone (P6, 48:135).

Zea:

I was telling you for us it's mostly peer review journal but for uptake, information you have need to be published in Development and Cooperation related journals. Those kind of development journals for example at the institute we have information on our research and published into two-page policy briefs (P12, 55:283).

Ruan:

Actually I think that we need to be interested in popular writings and then also coming up with the policy briefs (P13, 40:160).

Kai:

Yes. We are supposed to do policy briefs and maybe technical notes (P18, 58:262).

In this subsection, the interviewees suggested that if publication of research findings and recommendations could be made easier than it is now, this would aid their use and uptake. They therefore suggested that these findings be developed into policy briefs and technical notes.

### **6.11 Limitations to research uptake**

In this section, the thesis reports on interviewees' opinions regarding limitations to the uptake of the findings of their theses and other research in the field of ENRS. Their responses are presented below.

Nico, who had not yet published any aspects of his thesis since graduating and who had also not followed up on his thesis research, mentioned that the limitation to the uptake of his research findings was that he moved away from the field after his studies. He said:

Well I think it's an issue of ... one, because I moved quickly after the PhD I went to do an MBA and that was a very intensive programme, one-year intensive. I think I lost a bit of momentum in that regard. And when I finished too there was the urgency to just leave and when I got back there was an issue of employment. I stayed at home almost a year before finally I had it. So within that time I lost momentum and I just forgot about that (P20, 13:45).

He eventually lost momentum for ensuring his findings were made available to end users, including stakeholders, for effective uptake. In his case, moving away from the field of study after the PhD was the cause of no uptake of his research.

Zonja, just like Nico, attributed the limited uptake of her research findings to the shift in her field of study after her PhD. Zonja said:

No. I think when I come maybe because of my environmental background I was more focus on the environmental aspect and the current capacity aspect and all that. But then the post-harvest I haven't really pursued it (P15, 26:111).

However, Anje who presented her findings at a number of international and local conferences mentioned that the low uptake of her findings was due to the lack of interest of the key stakeholder involved in the project. Anje said:

So I went, and I said ooh I did my research work and then you know I have some policy and stuff like that. Ghana Water Company, I met them all right. They listened to me. But at the end of the day you could see that what you are telling them is not what they are interested in ... you know. I had a presentation with them because all along throughout the project work I got them so much involved in it and then I also have their support. so I also felt that it was proper that if I finish and I have my findings, we're looking at sustainability, how best can we ensure that the Barakesi Dam, because you complain also that its getting polluted and you are spending more money (P16, 21:79).

She noted that although she presented the findings to the main collaborators after her study, they were not interested in it. A lack of interest by the relevant stakeholders was therefore identified as the cause of the limited uptake of her research.

Nigel was an academic and a consultant for a major government project. His thesis and other research findings had not been taken up well. He noted that a lack of collaboration with industries was the cause of limited uptake of his findings. Nigel said:

Not much. Especially when you don't collaborate with the industries (P21, 52:178).

Harrie's view was that the limited uptake of his research findings and that of his institution could be attributed to dealing with the appropriate regulatory body that had the power to effect policy changes. Harrie said:

here we work with the Community Water and Sanitation Agency so when we have time to discuss issues we have done a lot of projects with them, we go to their office we share some of these things with them, the only problem is that they are not exactly a regulatory body, so they don't have control even though they make sure that the boreholes are put in place, when the boreholes are put in place that is about it. Here we still have issues, when people get problems, which is the only time they come with their needs, that is the only time they start thinking about us (P1, 30:79).

In addition to the above, he also identified a lack of collaboration with the beneficiaries of the research. He noted that these beneficiaries consulted the researchers for advice when there were problems. This limited the uptake of their research findings because stakeholders were only interested in research when they have problems that need urgent solutions.

Willem identified a lack of data as the primary limitation to the uptake of the findings from his thesis and other research. He mentioned that the lack of data kept him from publishing his work with high-impact journals. Willem said:

Because currently I have about eight publications out there waiting to be reviewed. But the problem is the data limitation. Now you send it to a journal they tell you that its data poor. That's one hindrance and also I don't have the funds now to collect additional data. I have collected some data now which I am going to use to update my thesis data. The other point is that the software I used was not a commercial software so it had a limitation of the number of variables you can add. So if you want to do that especially the (mudflow), then you need to get a commercial software. The other point is relating to commitment in the university where you have over 1 000 students to work with. So that has actually slowed me down. But I'm picking up. So right now we have about eight out there (P2, 50:140).

He mentioned the unavailability of good software that he should have used for analysing his PhD data. The software he used was not commercialised, so he could not have analysed the data even if he had collected field data. Finally, he attributed the large number of students he had to teach as a factor limiting his ability to focus on writing more articles from his research.

A lack of data, unavailability of tools for analysis and the volume of work in one's professional field were identified as factors that could limit the uptake of research findings.

Danie noted that PhD theses and research findings are too technical. Publications being technical is a factor that is limiting the uptake of research in the field of ENRS. He mentioned that he could only use the information when it is simplified. Danie said:

Even at the Faculty level, they were complaining that it was too technical and they didn't even know what these technicalities were. So, for the students, yes. I think I can do it but I only have to shape it well (P11, 13:58).

Thys mentioned that his challenge was co-authorship with other people. He notes that co-authorship prolonged the period he used to finish his manuscripts and send it to the publishers. The co-authors do not work on the document when they receive it, but since they have contributed to the research, one cannot simply take them out of the list of authors. Thys said:

But I have manuscripts, I think one of mine biggest challenges is that you know I am trying to

include as many people whom I think helped in one way or the other as co-authors and unfortunately when the paper gets to them, it's too difficult getting it back from them and somehow I feel bad that I will get rights and leave them out. So I put them in the acknowledgement or something (P14, 19:59).

Anje noted that there was a missing link between research produced at universities and users of the research. She mentioned the limitation to the uptake of research was a lack of appropriate mechanisms laid down by institutions for the dissemination of research findings.

Anje said:

you wanted to find out how research had been kind of uptake which I will look up as policy practice and what are the gap between and then what came into my mind was that, there are a lot sitting in our library in the universities and we have made recommendations and they are just not going anywhere. For me I think that there is a missing link. What exactly is the norm when you do your research work, you come out with findings, what mechanisms are in place for people are the end of the day. For now, where I find myself now, we are doing a lot of learning where we have platforms, where we try to bridge that gap between policies and practice but in the universities, what kind of mechanism is there for researchers who have come up with their findings that look for the platform available for you to make your recommendations. But what also happened is that right after my doctorate then I moved into something else, so I haven't really ... been interested to pursue those mentioned above anymore (P16, 17:73).

Finally, Anje, just like Zonja and Nico, said that moving away from the field of her PhD studies affected the uptake of her thesis findings. Moving away from the field of study causes one to lose interest in ensuring the uptake of research findings.

## 6.12 Summary

On citation from PhD theses, it was established that all of the four interviewees who had good research uptake of their theses, did their PhDs outside Ghana and worked in the field of water resources. The good research uptake of the four interviewees' research could also be attributed to the fact that water resources is an emerging field, and little research has been done and published so far. This may have led to current PhD students citing the four researchers' PhDs. Overall, there was poor uptake of theses from Ghanaian universities. That could be attributed to the unavailability of theses online, at departmental level and at the university libraries.

On the presentation of thesis findings at conferences, my study indicates that interviewees presented the findings of their theses at conferences because it was a requirement of their university or the scholarships they obtained for their studies. Interviewees who studied under a project had the opportunity to present their findings at regular stakeholder meetings and conferences and that ensured a fair uptake of their findings. Interviewees who studied for their PhD at Ghanaian universities mostly did not present their findings at any major conference. Most interviewees who studied part-time did not present their findings at any conference after their studies either.

Feedback from the conference presentations by interviewees were through emails, discussions after presentations and comments from experts. Overall, there was poor feedback from conference presentations.

In terms of knowledge of thesis uptake, it transpired that most interviewees in research and consultancy did not have any idea whether their findings were being used by stakeholders or end users. Although they monitored the policy processes and other activities of government ministries and departments in their field, there was no evidence that their PhD studies were considered in these activities. They perceived that government was not interested in research, including their own. These researchers worked in forestry, climate change and water resources.

However, researchers and academics who had been involved in some consultancies by government and other agencies had seen a fair level of uptake of their thesis findings and recommendations. This also holds for the fields of water resources and forestry. Findings showed that interviewees only had knowledge of the uptake of their theses if they were involved in projects directly linked to their PhD studies. In addition, the uptake of thesis recommendations was not really linked to the professional field after the PhD, but rather resided in opportunities one gets after PhD studies.

However, it is clear from the responses that they had not done much to get the knowledge from their theses to the end users. Uptake did not rest with government only, but also with the researcher. There has been good uptake of thesis research recommendations with selected interviewees who worked as researchers and academics. However, there were a few interviewees who had not made any effort to let their PG students work on the further research recommendations in their theses.

Comparing the years that most of them took to complete their PhDs and to publish it, outputs

of their PhDs have had a poor outcome due to low numbers of citations. Overall, interviewees published more journal articles than policy briefs and other forms of research outputs. Furthermore, interviewees often collaborated with their colleagues to publish articles and these publications more often appeared in international journals than in local journals.

The numbers of publications by interviewees in predatory outlets were high. This may have an effect on the future prospects of the interviewees. During academics and researchers assessment for promotion, the articles could not be found online or in some cases, the publishers did not exist anymore. This could affect the possibility for promotion. These publications were not available online less than a year after the publication date. Reasons for publishing in PJs included that requirements for publishing in established journals cannot be met by African researchers. The interviewees mentioned the instruments available for research and the data generated by researchers in developed countries are not the same as those in Africa. That explains why they opted to publish with PPs.

In addition, the number of exchanges and the tedious nature of the revisions that interviewees have to do in terms of their manuscripts before they are published, with the high impact of recognised journals, motivated some authors to publish with PPs, local journals or regional journals. However, interviewees share the view that the quality of their manuscripts is highly improved by the comments that come from reviewers of high-impact journals.

The interviewees who had knowledge of citation databases heard of these mainly from universities abroad. Interviewees who undertook their PhD studies in Ghana, but had knowledge of Scopus and WoS, were the ones who undertook some part of their PhD studies abroad for some months. In addition, most of the interviewees had knowledge of Google Scholar and a fair knowledge of Scopus. Most interviewees had no knowledge of Web of Science. Those who had a fair knowledge of Scopus did not know what the database were used for or even how to use it.

Interviewees, regardless of their professional background or knowledge of citation databases, did not see the importance to monitor citations from their PhDs. They had little understanding of the importance of citations for their professional careers and their institutions' visibility. Interviewees will continue to use Research Gate since these notify authors when others cite them in their publications.

On institutional mechanisms for uptake of research findings, it was found that research institutions and universities do not have any procedure laid down for the uptake of research



from their staff. Institutions mainly disseminate their findings periodically through workshops and conferences. In addition, there is little communication of findings from the institution to stakeholders. Institutions do not ensure that the findings of their researchers are available for the use of stakeholders in the field.

Finally, it was identified, amongst others, that a change in the field of work after obtaining a PhD, a lack of interest by stakeholders in the findings, a lack of adequate data and research infrastructure to carry out continuous and further research, a lack of institutional mechanisms and thesis publications being too technical are the major challenges to the uptake of research outputs, including the thesis findings.

The conclusion is that there has not been a good uptake of PhD research as reported by the interviewees. Interviewees did not personally ensure the uptake and utilisation of their thesis findings. Most interviewees had little interest in their PhD theses after graduation. Most of the interviewees had no knowledge of citation databases and that these had an effect on the way they published, including where they published. They had no idea of the importance of citations and the effect citations have on publications and career development. The limitations to the uptake of their research can easily be addressed by their respective institutions as it would not require much to eliminate those limitations.

### **6.13 Conclusions**

The process of research uptake begins by communicating the findings of the research. In this study we found that most of interviewees used three methods to communicate their findings: (1) through oral communication where interviewees presented their findings at conferences across the world, whilst some in academia also used their findings to lecture their students and others presented their findings to farmers and other stakeholders. (2) Most of the interviewees communicated their findings through publications. Interviewees published articles, book chapters and fewer policy briefs and working papers; (3) by making some effort to communicate their recommendations to policy makers and relevant stakeholders who can use them to influence policy.

The study found that the factors which motivated interviewees to present their findings at conferences were in some cases; encouragement from their supervisors; whilst for others, it was a requirement from their universities for them to present their findings at conferences before graduating with their PhD. Others also presented their findings at conferences and workshops because they had that opportunity from their networks. It is at these conferences

that the findings of their theses were communicated to participants. These conferences were a good point for uptake as participants asked questions after the presentations to have a better understanding of the research. After these presentations some interviewees received comments from participants that helped shape the final versions of their thesis, whilst others received emails for further collaborations, others established good networks.

Interviewees published a good number of journal articles, fewer book chapters and policy briefs. The study found that some interviewees were motivated to publish by their supervisors and others because by the practices and requirements of their university they were required to publish. Interviewees who are in academia and research jobs published because it was a requirement for their evaluation for promotion in their career. However, whilst it is good for supervisors and universities to encourage their PhD students and staff respectively to publish not all these publications were good. We discovered that a significant proportion of the journal articles actually appeared in predatory journals. Publishing in predatory journals is detrimental to research uptake and impact as papers published in many predatory journals disappear online few days after being “published”. Interviewees who had published in predatory journals indicated that the expectation for them to meet the requirements of the well-established journals was a major reason for them to publish with predatory journals. They considered predatory journals as a “second option”.

Another form by which findings can be communicated is by making recommendations to relevant policy makers who can adopt them into policy. The study found that two types of recommendations were made from the various theses: (i) general recommendations on the research to relevant stakeholders and (ii) further research recommendations for future research to ensure continuity in the field of their research.

Most interviewees had intended to communicate the recommendations of their thesis directly to policy makers. To communicate recommendations to policy makers, some interviewees developed policy briefs and sent them to selected government ministries. The distribution of policy briefs was influenced by the fact that it is a brief summary of their findings which policy makers can easily read and utilise the knowledge from it when appropriate. But in all cases where policy briefs were distributed there was no feedback received by the authors. The above suggests that there was little or no uptake of doctoral theses for policy through the thesis recommendation

However, interviewees who had the opportunity to work on government projects which were in line with their PhD research tried to incorporate some of their thesis findings into the final

project report. The interviewees who are involved in government and donor projects optimise that opportunity to make their recommendations known and also adopted into policy.

Another means by which recommendations can be communicated to policy makers is if the PhD author knows anyone in a position who can facilitate the recommendations to be used for policy. The study found that some interviewees knew people at positions including ambassadors and ministers and communicated their findings to them by visiting their offices as well as in one case at the PhD defence (where the ambassador was around) but not much was done afterwards. The above also shows that uptake – even when research has been communicated through personal communications – is not guaranteed.

Interviewees made some effort to communicate the findings and recommendations of their PhD research to the policy makers and communities that were used as study areas for the research. The factor that encouraged selected interviewees to go back to communities and policy makers with their findings and recommendations was the motivation that the findings will be “useful” in tackling some environmental and natural resources challenges. Interviewees believed that once they made such efforts to get the findings to appropriate authorities, it was not their responsibility to pursue the matter of uptake further. They believe they do not have the platform as researchers to directly use their findings and recommendations to influence policy. In addition, they also experienced that several recommendations from research have been made with no action taken by appropriate bodies and that the policy makers made them “frustrated” and made them not want to follow up on the uptake of their findings and recommendations.

The study also found that in selected instances where interviewees were given the opportunity by an institution to present their findings to staff of the institution, interviewees did not follow up to arrange for an appointment to present their findings. The interviewees rather wanted those institutions to follow up with them to make the presentation since the interviewee perceived the institutions as the ones responsible for research uptake.

The results of the interviews did find that research uptake can effectively be optimised through co-operation and collaboration with stakeholders. The major factor that warranted the above was by interviewee working in the same field as he or she did during the PhD and continuous collaboration with institutions that he or she collaborated with during PhD and afterwards. That collaboration is based on knowledge sharing over a long period of time. In addition, the study found that if the dissemination, communication and implementation of findings are to be optimised all stakeholders including those at the local level should be involved in the planning process. However, interviewees who were involved in community extensions work believe

their findings should not have been communicated to policy makers. They believe by working with the communities they have the appropriate platform to communicate their findings and thereby optimise uptake.

Based on the interviews conducted it is also clear that interviewees outside research and academia blame those institutions for creating the gap between research and policy and practice. They believe these institutions are not making much effort to establish mechanisms (including appropriate platforms) for researchers to disseminate their findings to policy makers and other end users. There seems to be a “blame game” going on across all professionals-research, academia, NGOs and government agencies as to who needs to take the lead and responsibility for the uptake of research findings. Whilst universities and research institutions claim ownership of the research findings they believe it is the duty of government to optimise the further uptake and utilization of the findings and recommendations into policy. Whilst in some cases government funds some of these research works in academia and research, government does not claim ownership of the findings. The above reiterates the strong culture of African governments not seeing research as relevant to national development.

Citations are a scientific method of monitoring and assessing the impact of one’s publications. The study found that publications from the doctoral candidates received reasonable numbers of citations. This means that their work has received some recognition by colleagues and other researchers. However, most of this group of researchers interviewed for this study, did not see it as important to monitor their citations. In fact, most of them clearly did not know how to do this and know very little about the databases that do this. The above indicated that interviewees are not interested in the impact their publications are having or receiving. To the interviewees it does not seem important to track/check whether their research has been used or cited.

The results discussed in this chapter show amongst others that there is no systematic attempt on the part of researchers to monitor the uptake and citation impact of their research findings. This could be a function of the fact that they are mostly novice scholars and are not yet embedded in an academic culture where these are important considerations. In addition, for most interviewees who have not been involved in government projects, they have no knowledge of the uptake of their recommendations amongst all stakeholders. To them, “it is not their responsibility to track and monitor the outputs from research”.

The results presented here would suggest that there is little awareness and appreciation of the need for uptake of research findings to policy and practice. There also seems to be the

view that researchers must produce new knowledge but not necessarily be the ones that should attempt to optimise the uptake of their findings beyond the expectation of proper communication of results through presentations and publications.

Finally, project plans, project proposals and their respective assessment forms should be made to guide both students and supervisors to focus towards research uptake.

## CHAPTER 7

### CAREER TRAJECTORY AND THESIS UPTAKE

#### 7.1 Introduction

This chapter presents a study of the job trajectories of all interviewees before and after their PhD studies. Section 7.2 begins with typology of PhD graduates as well as more details on the career trajectories for academics, researchers, consultants, employees at NGOs and interviewees working for government institutions.

Section 7.3 describes the fields of specialisation (whether they are generalists or specialists) of the interviewees. The career challenges of interviewees after they obtained their PhDs are presented and discussed in Section 7.4. The last subsection of this chapter presents the results of the interviewees' expected career trajectories for the next five to ten years following the time of this study. The responses link the career trajectories and their PhD studies. Finally, responses of interviewees on early after PhD career bottlenecks are also presented.

All responses are discussed against the broad context of earlier studies done in the field and it was investigated whether the findings were in line with earlier and existing studies or not. The objective of this section is to establish whether the career trajectories of interviewees after they obtained their PhDs correspond with their PhD studies and, by extension, whether the career trajectories helped with the uptake of their thesis findings.

#### 7.2 A typology of PhD graduates

It was evident from the CVs of the interviewees that many searched for positions with public institutions after obtaining their PhDs. These public institutions include the universities, research institutions, government agencies and ministries. The rest worked as private consultants and only one worked for an NGO. Apart from their full-time professional jobs, selected interviewees have done some consultancy work from the government, donors, international institutions and established local institutions.

Most of the interviewees preferred to be with institutions where their PhD degrees would be recognised. They described themselves as academics, research scientists, consultants and policy analysts. The interviewees were based at Ghanaian institutions and most of them did

have not international mobility, especially those who undertook their PhDs at Ghanaian universities.

Interviewees who ended up working at universities mainly taught and undertook research. Interviewees with the research council also mainly undertook independent research and, in most cases, supervised postgraduate students, mainly from Ghanaian universities. Those with government agencies undertook the duties assigned to them mainly as project staff or as the head of a division.

Obtaining a PhD helped interviewees establish reliable professional networks and, in selected cases, helped them to get consultancy work. The interviewees were spread across five regions of the country and, in some cases, had been involved in government policy formulation.

### **7.2.1 Career trajectories for academics**

The career trajectories of academics showed that most of them worked for academic institutions in Ghana before their PhD studies. They were either with a research institute at a university or were junior academic staff members at a university. Their careers as academics with PhDs involved mainly teaching and carrying out basic research. The career trajectories of selected interviewees in academic institutions are presented below.

Zea worked at an institution within the university before her PhD studies. She moved to a different institution within the same public university after her PhD. She taught courses which were not directly linked to her PhD studies. She has had a fair number of consultancy positions, mainly with government ministries and international organisations, to implement projects in Ghana. A fair number of her consultancy positions were related to climate change, which is a subfield of the general field of her PhD studies. She worked mainly in Ghana.

Luan obtained his PhD in Ghana and afterwards moved to another public university in Ghana. Before pursuing PhD studies at a Ghanaian university, he worked at the same university where he worked at the time of this study. He was a junior staff member and worked as an acting dean of his faculty at the time of this study. Since his PhD, he has had only one consultancy position in his field and collaborated as a consultant with other researchers from Ghana, Togo and Burkina Faso. He taught in fields related to his PhD. He also taught part time at another university. He worked in Ghana at the time of this study.

Danie was not employed by an academic institution before his PhD studies. After his PhD, he started work at a private university in Ghana, called the Central University College (CUC), as

a lecturer in the undergraduate programme. He taught courses related to sustainable development and environmental management. The courses he taught were related to his PhD. He has had six consultancy positions since graduation. In most of these consultancy positions, he was the lead consultant or principal investigator. These consultancies worked on climate change, agroforestry and sustainable forest management, and environmental management systems. Three of these consultancies were linked to his PhD. Danie also run an NGO at the time of this study which trained and held workshops in his field and mostly had government representatives attending the courses.

Willem was a research assistant before his PhD at the same university where he taught in Ghana at the time of this study. After his PhD, he was employed at the same university as a lecturer. He taught courses related to the field of his PhD studies. He has had one major consultancy position after his PhD studies with a programme sponsored by the government of Germany. He is the coordinator of the programme. The project sponsors and trains postgraduate students in selected African countries on climate change and land use. He was also responsible for organising capacity building workshops for stakeholders to present the findings of these PhD and master's students.

Lenny has been a lecturer before and after his PhD in the same department at the same university. He taught courses at both undergraduate and postgraduate levels at the time of his study. The courses that he taught were not directly related to his PhD studies. After his PhD, he has had a fair number of consultancy positions. The two major consultancy positions were one with the IRC in the Netherlands and another with a government regulatory body. The IRC project allowed him to travel to many conferences within Africa and Europe.

After Nigel's PhD, he assumed the position of lecturer at the University of Energy and Natural Resource in Sunyani, Ghana. He was not working before obtaining his PhD. The courses he taught were not directly linked to his PhD studies. He has had a fair number of consultancy positions after his PhD, including one that designed a capacity building component of the Akosombo Kpong Dams Reoperation and Reoptimisation in Ghana. This project sponsored 17 students for their MScs, MPhils and PhDs. The total amount of money involved was €70 000.

Ben worked on a project within a centre at the same university where he worked at the time of this study. He was the director of the same centre after obtaining his PhD. He only supervised postgraduate students. His line of work was not really linked to his PhD studies. He has had a fair number of consultancy positions after graduation, including being a mentor



for apiculture training for students at the University of Pennsylvania (USA), as well as the Kwame Nkrumah University of Science and Technology (KNUST), and at the International Development Summer Institute (IDSI). He also supervised two MPhil students since graduation. Since he worked with institutions that needed technology for their work, he kept contact with industry and NGOs.

At the time of this study, Janco was working in the same department within the university where he worked after his PhD. He taught and supervised postgraduate studies in the broad field of his PhD. His consultancy positions since obtaining his PhD were mainly not linked to his PhD, and were mostly not scientific in nature. One consultancy position was a baseline survey of the key activities of farmers' cooperatives and credit unions.

Finally, David was not working at any institution before obtaining his PhD. However, he started working at a public university in Ghana after his PhD studies. He taught and did research in the field linked to his PhD. He has had a fair number of consultancy positions, mostly with the International Water Research Institute, as well as with an agricultural products marketing company. His major consultancy positions were not in line with his PhD.

Generally, most of these academics taught in the fields of science and engineering. Most of them were working or had some contact with the institution where they worked at the time of this study. They did not carry out much research. Most of their research was undertaken locally. Those who studied abroad came back home just after their PhDs to continue working. The consultancy positions they have had were all locally based and mostly commissioned by international institutions. All of them have not been out of Ghana or been visiting scientists or scholars at other universities abroad at the time of this study. In addition, most of them taught courses in sciences and engineering, but most of their consultancy positions dealt with the social sciences and not the natural sciences.

### **7.2.2 Career trajectory for researchers**

These interviewees worked with research institutions. They were all with the CSIR in Ghana and mostly in the broad field of forestry and water resources. Their core mandate at the CSIR was to carry out independent research in their fields and also to disseminate their findings to the relevant stakeholders.

Harrie, Ruan, Gert, Zonja and Jan all worked for the CSIR. Except for Ruan, the rest were with the Water Research Institute at the time of this study. All of them also studied for their PhDs abroad (mostly in the United Kingdom, Germany, South Africa and the Netherlands) except

for Jan, who was not working for the CSIR before obtaining his PhD. The rest were staff of the CSIR before proceeding to undertake PhD studies. After their studies in Europe, they all returned to Ghana to continue their studies. They have no post-PhD professional work experience abroad. All of them have only worked in Ghana since obtaining their PhDs. Jan was the only one who worked in selected African countries.

Harrie has had a fair number<sup>16</sup> of consultancy positions since obtaining his PhD, including geotechnical studies on the Suitability of Solar Energy Project at Buiepe in the Northern Region of Ghana during January 2014. Most of the consultancy positions were not directly linked to his PhD, but fell under the broad field of earth science.

Ruan worked with her current institution before and since her PhD. She has not had any consultancy positions since her PhD thesis. She planned to work and consult in the field of her PhD studies, and not in fields which were not related to her PhD studies.

Gert was also a part-time lecturer at KNUST. Apart from being a full-time research scientist with the CSIR, he consulted for a fair number of donor institutions in the field of his PhD and MPhil studies. Most consultancy positions were in line with his PhD.

Zonja has had fair number of consultancy positions since her PhD studies, mostly with the Royal Society, The African Union and Newmont Ghana Limited. Her consultancy position from the Royal Society was linked to her completing the PhD in the UK in the field of aquaculture. Jan, during and since his PhD, has had a good number of consultancy positions with international institutions, including the German government, the Danish government and the African Union. He has worked in these consultancy positions in selected African countries, i.e. Ghana, Mozambique, Burkina Faso, Lesotho, Sao Tome and Liberia. He has also attended several conferences in and outside Ghana, and in all of these projects organised more than 21 knowledge-exchange workshops.

Kai has worked with the CSIR before, during and after his PhD. He did research in the same field as he undertook his PhD research work. He was the only interviewee in the field of research that undertook his PhD in Ghana. After his PhD, he had the opportunity to head the Ghana national seed bank which gave him the position to ensure the uptake of his PhD. He also had a fair number of consultancy positions including the Ghana for Forest Investment Programme: Enhancing Natural Forest and Agro-Forest Landscapes, Planting Stock

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<sup>16</sup> 'Fair number of consultancies' means more than four.

Improvement Programme from 2014–2019. Funding came from the World Bank and the African Development Bank (AfDB), as well as Greening of the Garden City of West Africa-Kumasi Urban Forestry Project. He was the lead consultant for all of these programmes.

For Kai and Jan, having consultancy positions with well-established and recognised donor institutions made them more mobile than the other interviewees. They have carried out research assignments in different parts of the world with other international scientists.

Most of the interviewees in research, just like the academics, returned home to work after their PhD studies. They mostly went back to the same institutions where they worked before leaving for their PhD studies. In addition, they worked and consulted for local organisations and a few government projects.

However, unlike the academics who mostly consulted in the field of social sciences, those in research consulted mostly in the natural sciences, and in the fields of their PhD studies.

### **7.2.3 Career trajectory for consultants, NGO employees and those with government institutions**

Most interviewees in this section undertook their PhDs in Ghana. Most of them, except for Thys, returned to the same institutions where they worked before and during their PhD studies. Most of them worked in a new field after their PhD studies. In addition, except for Anje who had two years professional working experience abroad after her PhD, all interviewees in this section worked locally after obtaining their PhDs.

Anje graduated from a university in Ghana. She worked at an international institution in Ethiopia for two years after her PhD and then moved back to Ghana to join a government agency. Upon her return to Ghana, she has been working with the Community Water and Sanitation Agency (CWSA) as a researcher. Her work involved advocacy and training of communities regarding water resources. Her job after her PhD involved policy formulation and implementation in her field, and also working with a cross section of relevant stakeholders in her field of study at the time of this study. She has not had any consultancy positions since her PhD.

Nico was not employed by any institution before his PhD. Since his PhD he worked in various disciplines in the field of environmental and natural resources, but not in solid waste management, which was the topic of his PhD thesis. He started off by being a project coordinator for two NGOs implementing a programme on climate change at the community

level. He moved from there to the Ministry of Environment and Science where he took on multiple roles. These roles included Operational Focal Point, Global Environment Facility (GEF); Focal Point, Climate and Clean Air Coalition (CCAC); Coordinator, Strengthening Environmental Management of the Oil and Gas Sector in Ghana; Coordinator, Facilitating Implementation and Readiness for Mitigation (FIRM); and Coordinator, Ghana Green Economy Program. He had worked for the ministries of health and fisheries as a consultant at the time of this study. He has had international mobility after his PhD because of the position he had in government.

Samuel was working for an international NGO before and during his PhD. He retired two years after he had obtained his PhD from a Ghanaian university. He has been a development practitioner during and after his PhD studies with the same NGO. He has not had any consultancy positions since his PhD.

Piet obtained his PhD from a Ghanaian university. After graduating he worked as a private consultant on projects mostly commissioned by institutions abroad, including Radboud University, Christian Children's Fund of Canada and the VIA Water Programme on water innovation in Africa. However, he did not take up much consultancy work, but he looked forward to joining a university after the date of this study.

Thys, although he still worked in the field of his PhD studies, worked in a different subfield within his broad field. He attributed the small number of consultancy positions since his PhD to his illness.

Interviewees reported on in this subsection, worked locally and did not have many consultancy positions since obtaining their PhDs. They seemed to work locally and found it difficult to find a place at the universities or academic institutions. Most of them worked in different fields from what they studied for their PhDs. That also affected the uptake of their theses findings. Anje and Nico, who had international opportunities and had been involved in projects outside of Ghana, were the ones with international mobility.

Overall, the study observed that academics and researchers who were working at specific institutions before their PhD studies returned to these institutions after their studies. They also had a larger number of consultancy positions than interviewees working for the government agencies and consultancies. In addition, interviewees who worked for academic and research institutions and who did their PhDs abroad were well recognised by donor institutions. They

also had more consultancy positions than their colleagues who undertook their PhD studies in Ghana.

Interviewees who did their PhDs abroad and in the field of sciences were more readily employed by the universities and research institutions upon their return than those who worked in the field of ENRS and focused more on the social sciences. Interviewees who undertook their PhDs in Ghana (and were not affiliated to any research or academic institution before graduating) had fewer opportunities to get employed by their institutions. They therefore worked mostly in different fields and even when they were employed, they were made to teach courses which were more related to their master's degree than their PhDs. Most of the interviewees did not have international mobility to visit other academic research institutions.

According to Béret, Giret and Recotillet (2002), young PhDs, being the main producers of knowledge, are mainly employed in the public sector as researchers. However, for a while they are attracted to the private sector. These assertions are in line with the findings of this study on the career trajectories of the interviewees. They mostly worked as academics or researchers. Even those who worked as consultants and for NGOs had long-term plans to become academics or researchers.

Béret *et al.* (2003) and Martinelli and Molinari (2000) noted that since the mid-nineties, papers dealing with the analysis of job opportunities for young PhDs showed an increasing proportion of them employed in the private sector. Young scientists, especially those with degrees in mechanics, engineering sciences or computer science, were more and more attracted to the private sector and less and less to academic careers. However, the findings of this study are directly opposite to theirs. Although the interviewees were in the field of ENRS (with some of them in engineering sciences) most of the interviewees were not attracted to the private sector at the time of the study. They seemed to have a lot of interest in and got satisfaction from joining academic and research institutions and working as academics and researchers. It could also be that, since the private sector in Ghana do not offer better job prospects than universities or government institutions at the time of this study, these PhD holders wanted to stick to the traditional typology, where PhD holders joined research and academic institutions.

#### **7.2.4 Self-description of interviewees**

After this researcher had grouped the interviewees into broad categories as academics, researchers, consultants, and those in government agencies, they were asked how they would describe themselves as per the trajectory of their careers after their PhD studies. This was

necessary because, although the interviewees did their PhDs in a subfield within the broad field of ENRS, they sometimes worked in a different field.

#### **7.2.4.1 Academics**

When the following interviewees were asked to describe themselves, the majority defined themselves first and foremost as ‘academics’.

Willem:

I am an academician. (P2, 90:260).

Samuel, who did not teach at any university, described himself as an academic, a consultant and a researcher.

I am an academic, consultant and a researcher but not the policy analyst (P5, 41:152).

Piet, who was working as a private consultant, considered himself as a researcher and an academic.

There also a different category from academic? I would say I’m a researcher at the same time an academician (P6, 64:173).

Lenny:

think an academician (P8, 61:305).

Luan:

in the nature of our work, our duties are into three. Teaching, research and community service. The teaching, that is academic. The research aspect makes you a researcher and the community service that will be consultancy. What you give back to the community. So once you are a lecturer these 3 things. We also, are more or less academic counsellors to our students (P10, 71:217).

Danie:

I’m an academician, a consultant and a lecturer. That’s what I am (P11, 57:296).

David:

I am a researcher. Everything I do is research-based. I’m a consultant because mostly it’s through a research that people would consult you for ideas that and I’m also a human capacity builder at the same time because whatever you find out in the research work needs to be inculcated into the young ones. Policy analyst I’ve not actually seen that angle (P17, 46:216).

Ben:

well I think I do all of them. And as I speak to you I am a policy (word not clear). Attached to the ministry of environment, science and technology. My work will end in July, under the same DRUSSAG project. (P19, 45:271).

Nigel:

I am an engineer, who is into research and then I do consultancy (P21, 43:144).

The interviewees were academics who, at the time of this study, worked at universities in Ghana, except for Samuel and Piet who worked as a consultant and an NGO staff member respectively. Those who were academics according to the work they did, considered themselves every time as academics, but also as consultants and researchers. This is attributed to their other primary functions where the universities required their staff to carry out research as part of their job descriptions and as a way to meet their promotion requirements.

Piet and Samuel, although they were not at academic institutions, saw themselves as academics rather than consultants and development practitioners. They maintained the notion that once you undertake a PhD you are automatically an academic, since PhD studies are pure academic work. Both of them had plans to join academic institutions after the date of this study as they progressed in their careers.

#### **7.2.4.2 Researchers**

The interviewees in this section who mostly work at the CSIR unsurprisingly defined themselves first and foremost as researchers although other job responsibilities were also mentioned

Jan:

I'm not a policy analyst but I do research, supervise students, once in a while part time teaching, PhD course module at Tech not every year but once in a while (P3, 57:107).

Janco:

I think by virtue of the fact I'm employed as a research fellow, I see myself as a researcher but beyond that I do other things but I think number one I'm a researcher and do other things like lecturing and extension (P9, 47:157).

Zea:

More of a researcher, though I do consultancy but I do more research than consultancy. (P12, 65:312).

Ruan:

no. I'm a researcher (P13, 54:201).

Kai:

Maybe a scientist first. Then maybe trying to be a consultant. But scientist first. That's the right profession (P18, 60:270).

Gert:

I see myself as a scientist, a researcher and an academic and as well as a consultant (P7, 61:262).

Interviewees in this subsection were academics and researchers. Although Janco taught at

the university and provided extension services to communities and farmers, he saw himself more as a researcher than any of the other additional functions he performed at the university. The other interviewees in this subsection were research scientists at the CSIR. All of them identified themselves as researchers and at the same time consultants at the time of this study. They saw the research work that they undertook for and with donors and others as consultancy services rather than carrying out independent research in their fields. The above gave some indication of why most of these interviewees carried out research that were not mainly linked to their fields of PhD their studies. They would carry out any work in the broad field that anyone brought to them because they saw themselves more as consultants than as research scientists. This is discussed in the subsection below.

#### **7.2.4.3 Consultant or policy analyst or development practitioner**

The interviewees listed below described themselves more as consultants rather than any other profession. They noted that their major duties at the CSIR was more consultancy work than carrying out independent research.

Harrie, who worked at the CSIR as a principal scientist at the time of this study, described himself as a consultant according to the role that he played at the CSIR. Harrie said:

I am more of a consultant than any of this, if I look at what am doing for the past couple of two years it's more of consultancy even though I'm supposed to do all those other things especially for promotion and other things but what I do more with my time now is consultancy (P1, 69:181).

Jan:

I do consultancy work some are research-based some are advisory in nature so it's a combination of all of that because many of the research work that I do they are design to support decision making so they ended up advising relevant institution (P3, 58:107).

Zonja:

Well I'll say researcher and consultant. I guess I'm supposed to pick just one (P15, 64:270).

Kai:

Maybe a scientist first. Then maybe trying to be a consultant. But scientist first. That's the right profession (P18, 60:270).

Jan, Zonja and Kai also worked at the CSIR. They also described themselves as consultants and researchers. Their primary function to them was to do consultancy work. They admitted that they were scientists because that is how they have been employed at their respective institutions.

Ben, who was a director at a technology development centre at his university at the time of



this study, did not describe himself as an academic. According to the roles he played at work, he saw himself more as a policy analyst rather than as a consultant or an academic. He advised government on scientific policies. Ben said:

well I think I do all of them. And as I speak to you I am a policy analyst. Attached to the ministry of environment, science and technology. My work will end in July, under the same DRRUSSAG project (P19, 45:271).

Nico, who has worked at selected government ministries on various projects, described himself as a lead consultant. Since he also gave advice to government based on the work he did for the ministries, he saw himself as a consultant. Nico said:

I am more of lead consultant. And I do policy analysis (P20, 39:177).

Thys, who worked with a government regulatory body in the field of forestry, saw himself as a development practitioner. Thys said:

Yeah it's very difficult. So I'm a little bit of development practitioner. I usually say I work in conservation and development (P14, 58:195).

Overall, interviewees who did some work directly for government described themselves as policy analysts. Researchers with the CSIR described themselves more as consultants than researchers. Academics saw themselves as lecturers, but also mentioned that they worked in the area of consultancy and research according to the policy of the university. Those working at universities described themselves according to the conditions of their employment. As discussed in some parts of this chapter, the way one describes him or herself has some effect on the uptake of his/her research findings.

### **7.2.5 Access to consultancies**

Further to the description of themselves, interviewees who have been involved in consultancy work after their PhD studies were asked how they obtained those opportunities. Interviewees mentioned various ways in which they obtained the consultancy positions. These varied from recommendations from their superiors and colleagues at work, to donors seeing their CVs online and, finally, networking.

Harrie:

People who know us recommend us so that is basically it. With research people come here all the time. We also talk to radio, and TV. So people know about CSIR-WRI (P1, 42:113).

Willem:

Because some people saw my work and what I could do. And others were through personal

contacts at conferences and others were through recommendations by colleagues and my professors (P2, 64:182).

Jan:

Some of them they are advertised and I apply for them. For instance, when you go to UNDP website like the last two projects. Also some people will recommend you and they will ask you to submit your CV and they will call you for interview so they are in different dimensions (P3, 39:71).

Piet:

Practically, I will say network and the network knowing what you can do (P6, 34:92).

Lenny:

Difficult to answer, what I know is I did a PhD that was from the sector at that time I was going to the field, interviewing people for people to know me, and have after that maybe some opportunities for me to help.

let's say, I was lucky, you see when I was going to defend my thesis, my first supervisor the British, which had left I think had some problems there so we left but we kept contact and then he told me, Kwabena there is this project they are designing, they have settled on Burkina Faso, this country and this country and they are thinking of either Ghana or Nigeria so if you come to Netherlands go and speak to this person so I spoke the lady and said the funding agency is knocking on Nigeria and can I provide this information, can I provide that information which I did that was the wash-cost project which was well funded, \$15 million four countries including Ghana. I manage a budget of about \$1 million, well-funded so money was not an issue and we really we wanted to do research, purely academic research that's why did the policy briefs a lot of policy briefs and spent time to engage policy makers and we spent time to make there was uptake, we followed up nationally and internationally. we even realised that we managed influence of a lot on the international level, Even than the countries we worked in. so even when we were working the project we said okay so which journals do we want to use, so we quickly checked journals, looked at the focus areas etc. and also as part of the work, you review some papers (P8, 30:121).

Janco:

Some of these were advertised, and if a friend applies and he thinks I can assist then he contacts and I said ok I can so we submit the bid and if we win we get on it (P9, 23:89).

Luan:

Some of them because you are in the same field, when somebody gets a job, like recently I was there but not all of them are successful. I was there and Legon they called me that they were putting together a proposal on climate change in the agro-ecological regions. Because of where I am positioned they want me to be on the team they demanded my CV then you take part in the proposal writing. You can be there somebody can recommend you because others have taught you (P10, 75:227).

Zonja:

It all started when they had problems with fish in their facility. Well they brought some portfolio

so I did the work, and then I wrote a report and then I wrote a recommendation for it. So they decided to pursue the recommendations that I made. So that is where it started from so they went on to give us a big project. Well the good thing about it is that whatever problems they had, we were able to solve it. So since then when they have issues they always call. With the African Union one ... well they said they saw my profile online but I'm not sure exactly where. And they thought I could be useful to them. So that is how that one came about. With the Newmont, I told you earlier on that they had a problem and they consulted us, I was asked to work on it because it had to do with what I did and then they pursued the recommendations I gave so that is how it started with them (P15: 44,193).

David:

No! I don't think I had those consultancies not because of my PhD, but because I do what I do the best (P17, 39:185).

Kai:

I was recommended by my director of FORIG. He just gave me the website. I sent them my CV and they ... even though they were picking from so many list, we were eighteen. When we went to The Hague when they saw my CV and what I have been doing in connection with tree seeds, they needed someone like that. So they quickly picked me out of the many (P18, 38:155).

Nico:

One thing PhD does is it enhances your analytical skills and ability to coordinate things whether from theoretical and empirical perspective. It actually enhances your analytical ability, so it's helpful. But the specific knowledge in solid waste management or the approach to achieving ... one of the issues I touched on in my PhD you know is like if you want to ... the brief model of policy in government for example, you want to come out with a policy, what are the supporting pillars of that policy such that when it is implemented it can actually achieve the goals. So that was the concept ... there are things that you need to have if you want to achieve certain goals, there are things you need to have first that will facilitate ... there are what we call low hanging fruits that you can ... for example awareness and education awareness. Because if you want to implement any policy, people need to be educated, be well informed about the new policy that you are bringing. And beyond that there are other supporting elements that will finally lead to ... Yeah you need to have all that. And some of them do not necessarily involve the commitment of large capital. Some of the institutions that we have already are playing some of those roles. The only thing is to ask them to direct their efforts towards those elements.

As I said I was in the ministry of environment and a master's in environment and resource management, PhD also in the same area with focus on waste management and an MBA ... sometimes your output before that background will sell you. So was just working normally and you realise that the minister kept on assigning responsibilities upon responsibilities and assigning jobs to you. And if you do it well, you get loaded with more and more responsibilities and so that is how come I got those opportunities (P20, 21:81).

Nigel:

I think it's the PhD network (P21, 36:114).

The interviewees mentioned above were consultants, researchers and academics. Most of the interviewees did not attribute the opportunities of the consultancy positions to their PhD studies. However, Lenny and Willem, who had sustained consultancy positions longer than most of the interviewees, attributed the consultancy opportunities to their PhD work. They mentioned that it was out of their PhD research work that such opportunities came about.

In addition, selected interviewees had the opportunities because of the field they researched for their PhDs. Examples of that are Zonja and Kai. Although for some of their consultancy positions they were recommended by their supervisors, that was done based on the work that they did for their PhDs. The method by which Lenny, Willem, Kai and Zonja had consultancy opportunities helped with the uptake of their findings since they worked in fields linked to their theses.

Overall, because selected interviewees worked in the broad field of ENRS and not the subfield of their PhDs, and also because most of them saw themselves as consultants, they looked out for consultancy positions and did not really care if it was not in their subfields. In addition, supervisors did not play much of a role in ensuring that their past students had some research (consultancy) opportunities in the field of studies of their PhDs.

### **7.3 Field of specialisation**

In this section, interviewees were asked if they saw themselves as specialists, generalists or both. The question was asked because the field of ENRS is a broad and interdisciplinary field. Most of the interviewees undertook consultancy work in the broad field which in many cases was not linked directly to their PhD studies. Selected academics also taught and supervised students in different subfields.

#### **7.3.1 Professional field: generalist**

Interviewees in this subsection who were consultants, development practitioners and academics mostly indicated that they were generalists. They noted that they worked in various subfields in the broad field of ENRS, and in selected cases, even in fields which were not linked to their field of PhD studies.

Piet worked as consultant in other areas such as child health and education, amongst others, which are far removed from his PhD topic. He believes undertaking a PhD makes one learn a lot of things outside his/her field of studies. Piet said:

I'm a generalist gradually becoming a specialist. Right at the last year of the PhD. I started

feeling it that okay this is what I've got myself into so ask me my special area it is livelihood, rural livelihood and environmental change. I have interest in many areas so once I got abroad I downloaded articles in many other areas not just environment and migration. Because I have many interests in different areas particularly child development and child education you see for example. Then you also see another part to the PhD that unconsciously you will learn a lot of things without knowing. You go for presentations, your colleagues present (P6, 74:183).

Similarly, Anje, who worked with a government agency at the time of this study on a project funded by the government of the Netherlands, saw herself working in other fields such as community development and advocacy which she did not study as part of her PhD. She believed this has not allowed her to assess and ensure the uptake of her PhD findings. Anje said:

I see a bit of advocacy in me, I think that one it came by accident and also by virtue of been at CWSA and IRC, I see myself as environmentalist, scientist, somebody who has passion for research work, working with communities so I go to the field quite often. Now I want to track what are the use, the uptake does it have any impact so this is how I see myself now (P16, 50:201).

David believed that the field of ENRS is an interdisciplinary field and that allowed him to view things holistically. He believed that the research and the other studies he undertook should not look only at the scientific aspect, but at the socioeconomic aspect as well. David said:

I would say I am a generalist. I would prefer to look at things from a very holistic manner than to perceive a niche for it. Then work from that because everything is so inter-related and I would strongly promote any other thing to be done in a more interdisciplinary manner than to look at it from just the scientific point or economic point of view (P17, 42:202).

Nico believed that by doing a PhD, he had acquired, developed and enhanced skills that allowed him to work anywhere and on many things. He therefore saw himself as a generalist.

Nico said:

I mean if there are thing that require specific skills ... where I've gotten to now, I can develop specific or specialises skills if required. Otherwise I can function anywhere ... yeah (P20, 28:135).

Nigel also saw himself as a generalist since graduating with his PhD. He taught and supervised students in areas he did not even study during his PhD. He was trying to narrow down and become a specialist in the field of water resources management at the time of this study:

This is my big headache. Let me tell you my life story, because I find myself in a very broad

field now. Why because I did a PhD in water resource management. I was supposed to come back and lecture, as a water resource management expert in KNUST. I didn't get the chance and then I was looking for a job. So I got a position at UENR totally different from my field, in sanitation. And I needed a job, so I took it. It was not I sat it that I had come for the interview for this project management before the post doc came. However, I didn't get this project management, we were two people selected chosen by African Development Bank, they chose the other guy and then I was still in contention but I was second placed. I started the post doc, totally different but I had to find a way to fit in even though it is environmental. And from PhD every knowledge is in water resources management then sanitation. And then somewhere in July ... she called me that ... but when I started the post doc in March, towards the end of March, my boss, professor Mrs. Awuah was appointed vice chancellor for the University of Energy and Natural Resources. She had no one to go there with so she wanted to go with me. And I didn't have a choice. So I even went there ahead of her to go and set up the place. So I knew by all means that I was going to lecture there. The in June, July, I think June, Togbiashe calls me that this position has become vacant. And this was directly in my field. So all along this was what I wanted to do. When Togbiashe called me I told him that now I find myself here, postdoc in sanitation. They called me when I was in Holland, attending a meeting. My professor was there, so as soon as the call came I told my professor that, Prof look at what is happening. And he said Eric drop the sanitation. Go to where you have been trained. So I said ok this is confusing. And you know, I've established long term relationship with Prof. Mrs. ... it's not easy to break that so when I came W. Ashie said Eric, you can do this job remotely, you don't need to be in Accra. And they needed me to save the project. Because otherwise, they need to go re-advertise and get someone and that one would just kill the project. So they actually had to force me to accept this. Then I feel very comfortable in my field. Now this is hydropower, energy which is good because my PhD looked at impacts relations development in agriculture so it was within and it's water resource management, water resource engineering. So I'm very comfortable in this. So the sanitation I was trying to look at the effluent from technologies they produce; whether we could use it for household irrigation. Then I can then shift it to my area. So that was what I was waiting for, to be able to do on the SANI UP Project. Then when I started here in August and then I started the university as a lecturer in September 2012. So three years. And when I went to the university I was asked to start a department of energy and environmental engineering as the only lecturer. And the first programme I had pull out. But the program advertised was BSc. Renewable Engineering. I'm the HOD and the only engineer at the programme. So I had no option but to begin to read energy and renewable energy to be able to give the students what they've come to do. Then the second year I had to add on environmental engineering. So it came such that now I had to add energy to my knowledge. Already, sanitation was disturbing me and now energy comes in. So I find myself now in four shoes: sanitation, water resource management, energy and I did a lot of projects also in the WASH sector. If you look at WASH-tech, I was a key player in WASH-tech, technology assessment framework. So I was a key player there. The WASH sector knows me more even

in the WASH activities that I do (P21:38,124)

Nigel had a very interesting experience. He did the same field of studies from his first degree to PhD. He wanted to be a specialist in the field of water resources. However, just after his PhD, his mentor moved him to a new university which was been established by the government. He ended up in the university even though he also had a job as a lead consultant on a big project. The position he was offered at the university was very different from his field he undertook his PhD and had to learn on the job. He was made to teach courses he didn't undertake throughout his entire university education. He found himself teaching and undertaking other activities in four areas which are not in line with his PhD. His life story is very interesting as it shows how he had to navigate between different opportunities but also commitments.

The interviewees in this subsection were researchers, consultants and academics. All of the interviewees saw themselves as working in the broad field of ENRS, and in the case of Piet, in areas which had no link to his PhD. They believed that to do a PhD gave one skills and a platform that helped one function in other areas not linked to the field of studies.

However, all of the interviewees who considered themselves as generalists noted that being a generalist affects the uptake of what you studied at the PhD level. Being a generalist does not allow one to specialise in any subfield and does not ensure continuity in the field, thereby affecting by extension the uptake of knowledge and findings from the PhD studies.

The interviewees also pointed out that being a generalist also stemmed from opportunities they had after their PhD studies.

### **7.3.2 Professional field: specialist**

But some interviewees did indicate that they saw themselves as specialists in a particular field. Although they worked in other subfields such as environmental impact assessment and policy analysis, this did not make them generalists. They asserted that all the activities they undertook as part of their professional career were in some way linked to their field of specialisation at the PhD level in most cases, and in selected cases to their master's degree.

Harrie:

No, I'm a ground water specialist, I do other things, but basically I'm a ground water specialist for example if you do environmental assessment for people who practice in water not only ground water but sometimes also water but my specialty is in ground water (P1, 63:173).

Lenny:

I am a specialist in wastewater treatment. Specifically, eco-technologies for treating wastewater. I am a water and sanitation engineer (P7, 50:216).

Luan:

Well I try to chart the course of the specialist. I try to work in only fresh water fisheries. I try to work on only fresh water not the coastal or marine. So anything about fresh water I can go there (P10, 55:162).

Danie:

Not the general field but I am into planning change forestry, tourism, energy. It's not general, it's a selected field (P11, 56:290).

Zea:

A specialist, because I look at human interactions with the environment. I don't look at anything else. For example, my colleague looks more at water issues. She comes to me to work on the social part whiles she looks at the science aspect so I don't do those ones in all, I just focus on the social interaction (P12, 49:269).

Ruan:

I will say that in fact for me my specialty will be functional ecology. That is what I will say. Actually, I will like to be a specialist in my field. I want to just continue very much in what I did in the PhD and so that's also part of the reason why I've just been very much by myself because then you need to, and it's highly something maybe technical. It doesn't have a lot of developmental components in it, but then over here also it is important that our research is really impacting very much on the society but you really need to be able to strategise and do something in your area of specialty but then you do other little things here and there just to generate the resources to push the main agenda. So for me that is the strategy that I would like to use. So not to just work in any area because of that also I'm a bit selective and I put priority on what I think and aligns with the area that I've taken (P13, 37:153).

Zonja:

I would say I'm a specialist. I will say in aquaculture and then sustainable agricultural development and then. Okay let me put it this way, environmental sustainability (is just in with) environmental system because even with aquaculture my works are more focused on maintaining the integrity of the environment (P15, 51:224).

The interviewees in this subsection defined them predominantly as specialists. This is most likely due to the fact that, after obtaining their PhDs, they had opportunities to continue work in their areas of specialisation. And being a specialist in the field helps one to ensure the uptake of his or her research findings and ensure continuity in the field.



### 7.3.4 Field specialisation: specialist but working in the broad field

The interviewees discussed here present a more heterogeneous profile. They taught and researched in specific areas in their fields. In most cases, they worked in fields linked to their PhDs. However, they have had a fair number of consultancy positions which were not linked to their fields of PhD studies.

Janco:

I consider myself as a specialist, but at times a generalist. That gives you a wider scope to operate, but I call myself as a land use system specialist or analyst. Trained in agro-forestry but in practice as a land use analyst (P9, 29:111).

Thys:

I will say both: the generalist just because of what I told you earlier on: because working on all animal species in eight different reserves across the country. The eight were what we did with the experts. Then I am also a specialist, because I have been working in the field of elephants for all these years. I have also helped to train a few more, I think that you know it's still one of my key areas. When you come to primates, or about monkeys, chimps you know those kind of animals it has always been. You can see from the CV that I started that from BSc even when I had no really idea of what the wild life job was going to be like (P14, 42:147).

Overall, interviewees who worked with research institutions and academic institutions saw themselves as specialists even when they worked in other fields. This is because their line of work was well cut out for them, so they knew the fields that they specialised in. In some cases, their fields were not even linked to their PhD studies. The study identified that the line which separated the professional lines of researchers and academics into specialists and generalists was the consultancies they undertook after their PhDs.

The study also identified that interviewees who worked as consultants and with government agencies undertook many development activities and therefore saw themselves as generalists. Most of their activities were in the broad field of environment and natural sciences.

A study on biotechnology scientists in Israel by Oliver (2004) posited that being a generalist-scientist in a technological specialisation and interests was associated with collaborations, whereas being a generalist-scientist in science specialisations and biological systems was not. This finding leads to the conclusion that not all facets of generalist-scientists were associated with collaborations (Oliver, 2004). The study findings of Oliver (2004) were in line with the findings of this study. Interviewees who identified themselves as generalists did not have as much collaboration as was expected since they work in the broad field of ENRS.

## 7.4 Challenges to career development after obtaining a PhD

In this section we present the results of comments made by interviewees on what they considered as the most pressing challenges they encountered after their PhDs. Challenges in one's profession after obtaining a PhD affect one's ability to disseminate findings of the PhD and other scientific outputs.

Interviewees' responses were grouped into the following themes:

- Lack of adequate and long-term funding for research
- Lack of reliable data and inadequate research infrastructure
- Combining teaching with research
- Lack of recognition by superiors and mentoring.

Interviewees mentioned that these challenges were not helping them improve on their research or the uptake of their research findings. The subsequent subsection presents the results of these challenges and discusses them in the context of some of the challenges young scientists face.

### 7.4.1 Lack of adequate and long-term funding for research

Interviewees often mentioned a lack of adequate and long-term funding as their basic challenge to their professions after obtaining a PhD. Although they mentioned some secondary challenges, the lack of funding to them remained the main challenge to continue research in the field and to ensure uptake of their findings.

Harrie:

Here the only problem that we have is funding to do what we want to do, basically the funding we have here are from donor agencies and they have their specific subjects and areas they want to work on. So basically if you want to do something that you want to do you have to find your own money, in the CSIR, government does not give any money for research, those days when we started it was a bit okay they sent some money but these days they don't at all, so the institutes are trying to survive, the projects are helping, you are basically doing what the man who is sponsoring you is asking you to, you're not, for example we have been doing assessment report for different regions in Ghana the ones that we did earlier with the little funding we had we finished it, in recent ones that we have been trying to do it has been very difficult because we don't get any (P1, 58:159).

Willem:

I mentioned some earlier, funds to continue with the work. So the other point is cooperation with colleagues. You have an idea you want to sell it and let colleagues ... It wasn't that there. So it wasn't there. So that was one problem I think (P2, 77:232).

Jan:

If you put that one aside, problem of funding for some of the works that we do what it means is that you need to have a strong network that can put you in a circle of group of people who are very strong with proposal development and funding because as you know the government do not provide funding for research so each one of us has to find funding somewhere outside the government for our research (P3, 53:103).

Lenny:

think the key thing is, people don't see the value of research in this part of the world, and number one is government. Because governments don't see the importance of research, is not funding for research. Am not saying government should fund everything but at least there should be a minimum start point to stimulate and I think that's very important (P8, 52:253).

Janco:

Number one funding, there are a lot of things I would like to do with my students but funding has been a problem there are times I had to use my own money. Just three weeks ago there is one student who is working on heavy metals pollution we had to pull funds together (two of us lecturers) and those are quite expensive. There are avenues now for us to apply for funding but it's not easy to get. For example, in KNUST there a facility KNUST research funding where you can apply for funding. Most us have not been clear at time you do it and you realised you've waste your time so I think funding is the problem if you had to get external projects where you get some funding and use your students on it is fine. Like the one I'm working on now from IITA (P9, 36:125).

David:

Of the most important one is access to finance. Financing some of the things you deem very relevant to be investigated into. We are so much restricted by that and so that will be the main challenge I would mention. Apart from that, I mean that leads into others. I mean the equipment are not there so you have the idea you can do the thing but you still can't go ahead to start it because you don't have the equipment. Sometimes, you may improvise but improvising is not always the best. It doesn't give you the results as you'd want it (P17, 48:222).

Kai:

Maybe the first thing is funding. That is the major challenge. All the scientists here we are facing a lot of funding problem. Money doesn't come from government. For years now we don't know the last time money came from government. They will pay your salary only. Never, it doesn't exist. So you need to group yourself together and write proposals. If by the grace of God, you get it. But it is not automatic because all over the world ... and you are not assured of the funding (P18, 48:205).

Ben:

The bottlenecks in fact, is the bottom line, finance. Because sometimes you want to do certain things ... now there were even some baseline studies I wanted to do on these cocoa pollinators themselves (P19, 40:251).

The interviews very clearly show that a lack of funds for research is regarded as a major challenge to their early development after obtaining their PhDs. To them, although government paid them salaries and some benefits, there was no money available for research. The challenge in getting funds for further research was also attributed to the lack of recognition of the value of research by governments and funding agencies.

Interviewees further identified the lack of cooperation and network amongst colleagues to develop good proposals in addition to the lack of adequate funds. They also mentioned lack of adequate research infrastructure as a challenge for their research and the uptake of their findings.

#### **7.4.2 Combining teaching with research**

Combining research with teaching in the university was identified as another challenge after completing their PhD studies. Teaching a lot of students and supervising them did not allow academics enough time to carry out their other activities of writing and publishing their research manuscripts.

Luan:

It's not easy, especially in our case here where you have too much in terms of constant teaching. This semester I'm teaching five courses. I'm doing about 10 hours more than what I was supposed to do I will try and look for the figures but it's more than 10 hours I was supposed to do (P9, 37:127).

Danie:

One, the total number of hours I spent teaching is taking a chunk of my time leaving just a few for research and writing. Another problem is funding for long term research (P11, 50:261).

#### **7.4.3 Lack of reliable data and inadequate research infrastructure**

After obtaining their PhDs, the interviewees in this subsection identified the lack of adequate research infrastructure and long-term data availability as the key challenges they faced in their fields. They noted that their institutions did not have adequate laboratories and equipment for research.

Nigel:

Beyond the data issue, access to many of these fine journals you need to read to broaden your mind on what is going on in your field and how to improve on them P3, 51:102).

Zonja:

Well there are no facilities. Well I will say more of funding. One of the biggest challenge here is funding, so you have to keep looking for funding otherwise you'll just be idle. Information is a big problem. We don't have access to e-libraries and current books (P15, 56:242).

In addition, they mentioned the lack of literature and scholarships, including their inability to access e-libraries and current publications (at the time of this study) for their research work and students' supervision. To them, the lack of information was a key challenge after obtaining their PhDs.

#### **7.4.4 Lack of recognition by superiors and mentoring**

After obtaining their PhDs, some respondents indicated that their superiors and senior colleagues at their respective institutions did not give them the needed recognition. Lack of recognition was their primary challenge after obtaining their PhDs.

Gert:

When I came, immediately I felt like people have forgotten that I existed. Sometimes people take decisions and it is like, don't they know I'm around and I have this expertise? So it is like people had forgotten that you used to work here. Even your own supervisor, Dr MJ was taking certain decisions that I could easily have handled but it was like in his mind he has forgotten that AN is around (P7, 56:240).

Luan:

You know this our profession it is all about mentoring. You always need somebody to mentor you. When I returned, with my field there was a staff but he also was in abroad studying so when I came back to this (P10, 62:186).

Zea:

When I went to my PhD I was one of the oldest but here you are seen as young person especially people who saw you progressing through the system. So sometimes it's difficult to interrupt with these people professors because they still see you as a small girl. Some of them did their PhD in Nigeria and USA which took them like ten years but now people are getting PhD in three and four years. Sometimes these are some of the frustration (P12, 57:289).

Nico:

Sometimes you want to make ... where I found myself in the ministry, you'd ... especially there had been people, a lot of people who have attained where they are by long service. They've been there for a long time or by experience. And now you find yourself a young with PhD and then sometimes you get, aside responsibilities, ahead of them. Then there is that. Politics challenges you have to manage. But I think I was ... But that could also be a challenge especially if there is change at the helm of affairs (P20, 33:155).

These interviews show that some of the PhD graduates believe that their supervisors have some responsibility in ensuring their success in their subsequent career. They therefore "complained" about the lack of recognition about the importance of having a mentor to guide them through their early career development after obtaining their PhDs. They noted that having a mentor would have been good for their career development including the development of proposals and writing more publications and, by extension, ensuring their research uptake.

Overall, academics and researchers mentioned the lack of adequate funds for research as the major challenges in their fields. In addition, they also mentioned the lack of adequate research infrastructure as another challenge for them. Interviewees involved in consultancy and development work mentioned a lack of recognition by their superiors as the major career challenge after obtaining their PhDs.

The challenges identified by interviewees had a fair level of impact on the uptake of their research findings. Especially with lack of funds for independent research in their institutions they had to rely on donors to carry out research which in most cases was not in line with their fields of PhD studies. Interviewees could not ensure continuity in their fields of research if these challenges should persist.

## **7.5 Career trajectories for the next five to ten years**

In this section, interviewees were asked how they envisage their career trajectories for the next five to ten years. This was to investigate whether interviewees were going to remain in the field and attempt to optimise the uptake of their research findings.

Interviewees' responses on the question were placed into the following categories:

- Get more consultancy work
- Remain in the field and do more publications
- Rise through the ranks
- Move to another institution
- Enhance research in the field

Although interviewees identified the above as their possible career trajectories for the next five to ten years, their decisions were mainly affected by their age, the institution where they worked and also the opportunities that they perceived that were available to them. Most of the interviewees who were more than 50 years old wanted to do more consultancy work in the next few years before they would retire. Interviewees who were younger than 40 years wanted to publish more and rise through the ranks at their respective institutions. Their responses are discussed below.

### **7.5.1 Career development over the next five to ten years: get more consultancy work**

Interviewees in this subsection saw themselves taking on more consultancy work over the next five to ten years. These were the same interviewees who earlier described themselves as consultants. In addition, most of these respondents were more than 50 years of age, either retired or nearing retirement

Harrie:

The way I see things now I don't think it's going to be different from what I'm doing now. It's more of consultancy, the way I see myself now I think it's more of being a consultant because all the other venues, there are few things that we have tried to do here (P1, 74:187).

Samuel:

Once I have retired, I don't think I want to go back to active government service or any other thing. It's my own private career I want in terms of consultancy to help development and the evaluation of projects (P5, 45:179).

The interviewees in this subsection wanted to focus more on consultancy work than anything else. They also did not want to publish. Their vision on the development of their career trajectories over the next five to ten years would definitely not ensure the uptake of research findings in their fields.

### **7.5.2 Career development over the next five to ten years: remain in the field and do more publications**

The interviewees in this subsection saw themselves primarily remaining in the field of ENRS and, in selected cases, the field they studied for their PhDs. They also wanted to publish more in their fields over the next five to ten years. There were seven interviewees in this group.

Willem:

That one it's...since now I have shared some responsibility it's going to have a higher impact because there are a lot of publications that are in the pipeline that are coming up. For monetary reasons if I get any good job I'll go (P2, 92:266).

Jan:

No! no, in terms of the field I see that I will remain in that field water resources, climate change issues as long as it won't disappear because we have a lot of terms that has come and disappear but I think the issue of climate change will remain till the end of the age of course water resources issues too would be there. It is not going to go away (P3, 66:117).

Lenny:

Not sure if I want to move or maybe I need to. I am thinking if taking my sabbatical then I will come back, if I have an interesting place to do a nice research which can be used. Remain in the same area, the area is big, you say you do a research evaluation. I do a bit on water and sanitation and evaluation. I think it's exciting and interesting because every evaluation is different (P8, 45:220).

Janco:

Accidentally, I may not have that much time. In four to five years' time I will go on pension actually but I'm hoping to do more research, do more publication, get to the professorial level, and work more with farmers (P9, 52:171).

Luan:

It's just because of my publications with this predatory journals list that is now the temporal setback because as at the time we were publishing we didn't have this. So now we have to realign ourselves so you can publish in the top notch journals (P10, 77:233).

Danie:

Maybe by then, I would have been a professor with a number of publications, projects and then being part of problem solving, contribute to knowledge, be part of problem solving in Ghana. At this stage I am not thinking of changing my field (P11, 63:308).

Ruan:

In the next five to ten years I really want to be able to publish a lot, number one, but then also be able to land a big project that can impact on the community. That's really the target and then be able to also help students (P13, 58:211).

The interviewees in this subsection were mostly researchers, but mainly at academic institutions. They noted that by remaining in their fields and publishing more than before, they could ensure that their research could have great impact by being utilised by end users. They mentioned that the field of ENRS is a broad field. Therefore, they did not expect research in the field to come to an end anytime soon. That was their reason to remain in the field. By remaining in the field, they would get more consultancy work.

### **7.5.3 Career development over the next five to ten years: rise through the ranks**

The respondents in this section pointed to the desire to rise through the ranks within their institutions. They see themselves as publishing more articles in their areas of research. They mentioned that by publishing more, they could meet the requirements for promotion in the various institutions they are currently working in.

Piet:

I think I should have become an associate professor, published a lot, in fact I have so much on my desk (P6, 75:185).

Zea:

I want to publish more and get my promotion. Yeah, my field is very broad. I told you I'm working in social issues, health and others. I can work in everything, everything has environmental dimension and every environmental dimension you can come out with a social dimension. So, so far as there is a social dimension I always fit into it (P12, 68:318).

Thys:

I don't know. I have dreams, I am hoping that for example there has been a position that has been advertised for the post of Director of Operations. I have applied for it even though I'm competing with other very good people: Two of them my seniors. So it would be tough but I'm just hoping that if because I think I have a lot of ideas that I want to implement (P14, 61:203).

Zonja:

I may be interested in doing well in a managerial position or working with an international organisation. So that is my goal I'm looking at (P15, 67:284).



These interviewees in this subsection were in various professional fields discussed in this study. Their visions were self-motivated. They would remain in their fields, but also wanted to rise to top positions in the coming years. They did not mention the need to get more consultancy work than before.

#### **7.5.4 Career development over the next five to ten years: move to other institutions**

Interviewees also indicated that they wanted to move to other institutions within the five to ten years after the date of this study. Those in research would like to move full-time to an academic institution. Those already at academic institutions looked forward to moving to institutions where they could have better remuneration benefits than was the case at the time of this study. Most of these interviewees have had a fair number of consultancy positions and described themselves as specialists who work in the board field of ENRS:

Gert:

I am hoping to move to academia full time and hopefully become an associate professor and later a full professor within five years (P7, 65:272).

Anje:

For now it's all about working on project. Working on project is like a conveyor belt you are always moving but I don't see myself working on project for that long. I might go back to the academia but my only reason for not starting with the academia was I wanted some experience, working with NGOs and others to get that kind of experience ... I felt teaching was a bit boring but who knows in the next five years I might go back into research and teaching than only doing NGO research, action research like I'm doing now (P16, 53:205).

Nico:

I might leave academia, maybe after ten years. After five years I will probably not be here, or I might probably not be in Ghana consulting. I see myself working for one of the international communities (P20, 42:276).

Interviewees who were with NGOs and government agencies mentioned that they had intentions of moving to academic institutions within the next five to ten years. In addition, interviewees in this subsection did not really mind whether they moved to other fields than those related to their professions.

The interviewees in this section wanted more consultancy work. They would not ensure the uptake of research in their fields, but looked rather for better opportunities with better benefits than they had at the time of the study.

### **7.5.5 Career development over the next five to ten years: enhance research in the field**

Interviewees in this subsection wanted to enhance the research done in their fields. They wanted to remain in the field and wanted to ensure that others are trained in the field. In addition, they wanted to change how research is done in the field and also wanted to ensure uptake of the findings in the field.

David:

In the next five years, ten years I still see myself to be in the northern region though I didn't grow up here. I see myself to actually help to streamline some of the scientific ways that things are done and to help the institution that I'm working in to develop beyond what it currently is. I also see myself growing up, building up my capacity to further enhance what I can do in a bid to build upon the general humankind in the region and eventually across the country (P17, 55:246).

Kai:

I am thinking that Ghana should get a very good seed centre for plant conservation, for seed conservation. I am working towards that seriously. I want it to be established. So if it is there, we can conserve a lot of seeds or species that will get extinct due to climate change. Apart from that we need to do a lot of afforestation to start this plantation development project. So I think I have to work harder and maybe train few other guys. To stay around and train some other guys because if I'm not available, the work should continue. So I have been telling students ... these national service guys they come and they are interested, but with funding a problem ... when they finish they are not even assured of a placement here or MOFA or forestry commission. Most of them are here knocking on our doors for employment but there is no employment. So I wish those few guys we have trained gets employed and they will understudy us and when we are not here, they will take over (P18, 62:274).

These interviewees were researchers and academics. They wanted to remain with the same institutions to support the development of their fields. They also wanted to train more post-graduate students in their fields than was the case at the time of the study to make sure that their research benefits key stakeholders at the community level.

### **7.6 Summary**

Generally, the typology of these interviewees showed most of these academics teach in the fields of science and engineering. Most of them were working at or had some contact with the institution where they were working in during their PhD studies. They did not carry out much research after their PhD studies. Most of the research was undertaken locally. Those who studied abroad also came back home just after obtaining their PhDs to continue working here.

The consultancy positions that they have had were all locally based and mostly with international institutions. None of them has thought of leaving Ghana or going abroad as a visiting scientist or scholar at the universities abroad.

In addition, most of them taught courses in sciences and engineering, but most of their consultancy positions were in the social sciences and not the pure sciences. Interviewees in research, just like the other academics, returned home to work after their PhD studies. They mostly went back to the same institutions at which they worked before leaving for their PhD studies. They worked and consulted for local organisations and for a few government projects.

However, unlike the academics who mostly consulted in the field of social sciences, the researchers mostly undertook consultancy work in the pure sciences in the fields of their PhD studies. That ensured good uptake of their PhD findings.

Interviewees who were academics and researchers, and who were working before their PhD studies, returned to the same institutions after their studies. They also had more consultancy positions than interviewees who worked in government agencies and consultancies. In addition, interviewees who worked in academic and research institutions, and who did their PhDs abroad, were well recognised by donor institutions. They also had a larger number of consultancy positions compared to their colleagues who undertook their PhD studies in Ghana.

Interviewees who did their PhDs abroad and in the field of sciences were more easily employed at the universities and research institutions upon return than those who focused more on the social sciences. Interviewees who undertook their PhDs in Ghana (and where not affiliated to any research or academic institution before graduating) had few employment opportunities at their institutions. They therefore mostly worked in fields other than the fields of their PhD studies. Even when they were employed, they were made to teach courses which were more related to their masters degree than their PhD studies. Most of the interviewees did not have international mobility to visit other academic research institutions.

Interviewees who did some work directly for government described themselves as policy analysts. Researchers with the CSIR described themselves more as consultants than researchers. Academics saw themselves as lecturers, but also mentioned that they worked in the area of consultancy and research as per the policy of the university. Those in academic positions described themselves based on the conditions of their employment. As discussed in some parts of this chapter, the way an interviewee described him or herself had some impact

on the uptake of his/her research findings.

However, all of the interviewees who considered themselves as generalists noted that being a generalist affected the uptake of their PhD findings. Being a generalist did not allow one to specialise in any subfield and did not ensure continuity in the field. This affected the uptake of knowledge and findings from PhD studies.

The interviewees also pointed out that being a generalist also stems from opportunities they had after their PhD studies. In summary, the career trajectories and consultancy opportunities made one a generalist.

Interviewees who worked with research institutions and academic institutions saw themselves as specialists even when they worked in other fields. This is because their line of work was well cut out for them, so they knew the fields in which they specialised. In some cases, their fields were not linked to their PhD studies. The consultancy work that they undertook after their PhD studies separated the researchers and academics into specialists and generalists. Interviewees who worked as consultants and with government agencies undertook many development activities and therefore saw themselves as generalists. Most of their activities were in the broad fields of environment and natural sciences.

On the major challenges in the field of ENRS research, that the academics and researchers mentioned was the lack of adequate funds for research as the major challenge. They also mentioned a lack of adequate research infrastructure as another challenge. Interviewees involved in consultancy and development work mentioned a lack of recognition by their superiors as their major career challenge.

The challenges identified by interviewees had a fair level of impact on the uptake of their research findings. With a lack of funds for independent research in their institutions, they had to rely on donors to carry out research. In most cases, such research was not in line with their field of PhD studies. Interviewees could not ensure continuity in their field of research if these challenges should persist.

Interviewees envisaged their professional development in five to ten years following this study as described below. Academics who have had some consultancy work mentioned that by remaining in the field and publishing more, they could ensure that their research would have greater impact by being utilised by end users. They wanted to remain at the same institutions to support the development of their fields. They also wanted to train more post-graduate

students in their fields and make sure that their research benefits key stakeholders at the community level. They mentioned that the field of ENRS is a broad field. Therefore, research in the field is not coming to an end anytime soon. That was their reason to remain in the field. By remaining in the field, they would have more consultancy positions. They also wanted to ensure the uptake of their research findings.

Researchers and academics who were younger than 45 years of age wanted to remain in the field, but they also wanted to rise to top positions in the years following this study. They did not mention the need to get more consultancy work. Interviewees who were with NGOs and government agencies mentioned that they had intentions to move to academic institutions within five to ten years following this study. In addition, interviewees in this subsection did not really mind if they moved to fields other than those related to their professions.

## **7.7 Conclusion**

The results show that across all categories – scientists, academics and consultants – most of the interviewees engage in a wide range of scholarly and research-related activities. They do research, teach, supervise and pretty much everyone does consultancy work. This is surely because of the poor remuneration of both academics and scientists in Ghana which means that once you complete your PhD – even if you get or have a permanent job – you still look for consultancy opportunities. This has far-reaching implications for the further uptake and impact of your PhD work. If you are fortunate enough to get a job or consultancy opportunity in the same areas as you PhD, there is the possibility of “spill-over” from the PhD to this area. However, we also saw much evidence by our interviewees that they gladly (sometimes) take on consultancy work even if it has no relationship with their PhD. In fact, some of them even try to rationalise this by arguing that the field of natural resources science is holistic and interdisciplinary in nature and hence prepares one well for other fields (even social science applications).

Related to the first point, is the interesting result that some of the interviewees do not actually believe that their PhD prepared them for a topic of specialisation. This goes against the conventional understanding of a PhD as a very clear moment where you specialise in a specific field and therefore make a contribution to the body of knowledge. It is not clear whether this view is held because of the interdisciplinary nature of natural resources science or because of other perceptions about subsequent job opportunities.

Some interviewees undertook consultancies because they saw that as an avenue to collect data for their publications. However, their consultancies are mostly not of a scientific nature and therefore do not use appropriate scientific methods to collect data. The above affects the quality of data generated for their publications. Interviewees complained that one major reason why established journals do not accept their articles is the inadequate nature of the data they present. This practice of using consultancy data for publication should be streamlined by institutions to make sure researchers publish from scientific data.

Interviewees used the number of consultancies they had after PhD to measure the success of their career. The number of consultancies is often used as a measure of experience in the field. In addition, the study found that consultancies were used as a mechanism for uptake of interviewees' recommendations. However, most of these projects that interviewees work on as consultancies are foreign funded and the expected results are mostly not in line with their thesis recommendations but the objectives of the donor/sponsor. This means that consultancy opportunities are not necessarily an appropriate way for interviewees to optimise their research uptake.

Results across all categories – scientists, academics, consultants show that the career development for the next 5 – 10 years for most PhD holders in general in Ghana is that they want to be in academia or research (for those who are already in) and same for those who are currently working for NGOs and government agencies. Those in NGOs and government agencies see their current profession as short-term plan to meet their long term aspirations of getting into research or academia. The major factor that makes PhD holders in Africa want to end up in academia is to accomplish their primary motivation of undertaking PhD studies and to become lecturers or researchers with public institutions. In addition, they see public research institutions and universities as places where they can have extra time to undertake consultancies apart from the regular teaching and student research supervision. The above is not the same for PhD holders in the developed world where most PhD holders end up with the private sector and industries. Private sector and industries are good avenues to optimise uptake of thesis findings and recommendations

In addition, interviewees want to remain in the field because they see the field as broad and also with many opportunities for consultancies and not necessarily to ensure the uptake of their recommendations and findings. The above results indicate that PhD holders in Ghana do not concern themselves overly with the issue of uptake. They want a permanent position, to teach and do research and publish mainly for promotion. The PhD holders do not see the issue of uptake as part of their work as researchers and academics.

Across the professional field descriptions of one being a specialist or generalist, we found that interviewees' publications after PhD had some linkage with how one described him or herself. Most of them saw themselves working in the broader field of ENRS and therefore did not see it wrong to publish with colleagues in very different subfields. An example is one interviewee who specialized in geography for his PhD. Post PhD, he was a co-author in all his publications, publishing with colleagues in the physics, social science and water resources. The study found that the interviewee didn't contribute to the research but since he considered the field to be broad, his name was just put in the publication. When researchers work in the broad field of ENRS and do not specialize in subfields, it does not ensure research accountability, a major problem for the African research system.

## CHAPTER 8

### FORMS OF RESEARCH COLLABORATION AND BENEFITS OF NETWORKS

#### 8.1 Introduction

This chapter presents the results on the forms of collaborations and networks interviewees had established before and after their PhD studies. Forms of collaboration and networks are relevant for career development, continuity of research, uptake of research recommendations and other research findings.

The first part of this chapter presents the results of the interviewees' contact with their PhD supervisors during and especially after their PhD studies. Furthermore, the type of contact and collaboration between the interviewees and supervisors is also presented. The next section then presents a discussion on whether these contacts and collaboration(s) have helped in the uptake of interviewees' research findings and consultancy work, including research opportunities after PhD.

The second part of the chapter discuss the networks that interviewees had formed. The participants explained how these networks were established and whether doing a PhD played a part in the establishment of these networks. The composition of each interviewee's network – i.e. local or international – is also presented. Finally, the benefits of these networks are discussed.

#### 8.2 Form of research collaboration

This sections reports on the various forms of collaborations interviewees established during and after their PhD. It further discusses the relevance of these collaboration to the uptake of interviewees' theses and other research outputs after PhD.

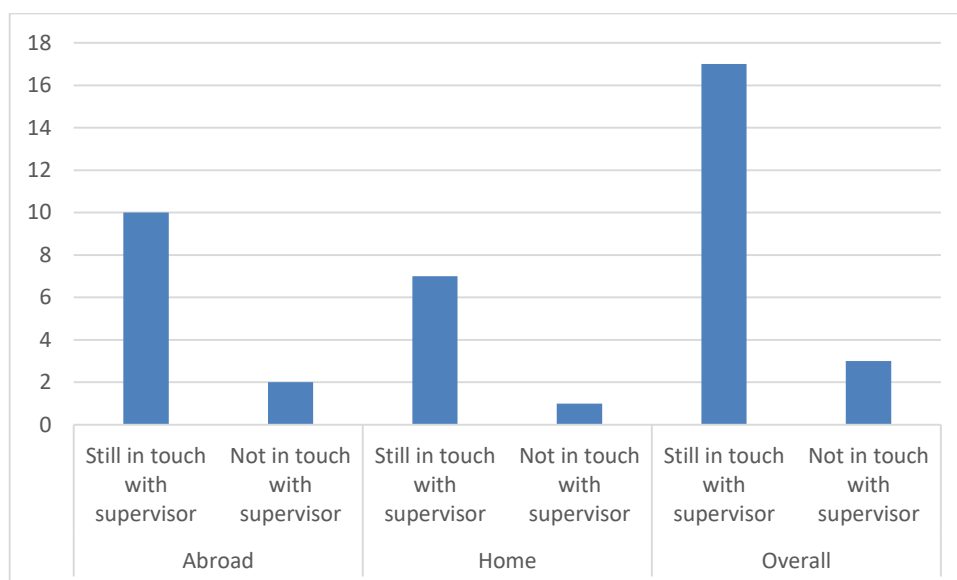
##### 8.2.1 Contact with supervisor after PhD

We asked interviewees whether they still main contact with their supervisors after the completion of their PhD studies. The form or type of collaboration with their supervisors is also reflected.

Out of the twenty interviewees, 17 mentioned that they still kept in contact with their supervisors (as depicted in Figure 8.1 below). The remaining three did not maintain any



contact with their PhD supervisors. One had lost her supervisor after her PhD studies and another was not keeping in touch because he was working in a different field at the time of the interview.



**Figure 8.1 Interviewees' contact with their supervisor**

Out of the eight interviewees who undertook their PhD studies in Ghana, seven were still in touch with their supervisors. The one interviewee who did not keep in touch reported that he received poor supervision during his studies and his supervisor had subsequently retired.

Overall, interviewees kept in touch with their supervisors and it did not matter where they undertook their PhD studies. In addition, although some interviewees no longer worked in the field of their PhD studies, they still kept in contact with their supervisors. In addition, their professional field after obtaining a PhD, did not have much influence on their contact with their supervisors.

Interviewees who still kept in contact with their supervisors were asked which form of contact they kept. Some interviewees mentioned that they either published with them or just kept casual contact. Others mentioned that their supervisors gave them consultancies or involved them in projects.

Harrie and Thys have been in contact with their supervisors for five years since they had graduated with their PhDs. However, they kept casual contact. They neither published with their supervisors nor did they do any research with them after their PhD studies.

Harrie:

yes, I still have contact with him. Once in a while I send him mails and also publications as well. When I came back there was one publication we did since he was my supervisor, I still included his name so I consulted him, and I still have contacts. I've not been back there after the graduation. After the graduation I've not been back there but we still keep in touch through some of the friends who are still working with him (P1, 8:20).

Thys:

Now we are more like friends or colleagues you know, especially because I intend to publish a number of papers out of my thesis (P14, 8:25).

The interviewees below (Piet, Zea, David and Nigel) kept in contact with their supervisors after their PhD studies. They published journal articles from their theses with their supervisors. Their supervisors also gave them a fair number of consultancy positions and research opportunities after obtaining their PhDs, mostly in Ghana:

Piet:

... yeah. We maintain good relationship. Publishing level is there. Then we also collaborate at projects levels (P6, 21:59).

Zea:

the one that I don't really collaborate is Prof. Dr WX. Prof. Dr SWT too is retired and works as a consultant, so sometime if he needs me to do something for him, he writes to me. Prof. Gordon is still my boss at the IESS (P12, 59:298).

David:

... we do publications together, we discuss on issues when there is going to be research works, something that they are interested in. they always let me know so that they always seek my opinion on issues every now and then. So we are really in touch (P17, 5:20).

Nigel:

We publish and then we also interact. Sometimes when my professor sees an interesting thing he connects me to it (P21, 11:31).

The interviewees reported keeping contact with their supervisors after PhD ensured some mentorship. It kept them in the field and, by extension, ensured some level of uptake of their research outputs, especially their thesis outputs. Overall, interviewees who studied in Ghana kept some contact with supervisors but it was mostly on a casual basis. Supervisors were not involved with them on publishing or giving them opportunities after PhD, except for two interviewees.

**Table 8.1 Interviewees' contact with their supervisors**

Interviewees	Total number	Contact with supervisors	No contact with supervisors	Form of contact
ZEF Group	3	3	–	Publications, consultancies, research projects
UNESCO group	3	3	–	Consultancies and periodic email exchanges
Ghana group	8	7	1	Publications and periodic email exchanges
Abroad group	12	10	2	publications, consultancies, research projects
Interviewees who studied on projects	6	6	–	publications, consultancies, research projects

Interviewees who studied at ZEF and UNESCO seems to have kept very good contact at all levels with their supervisors especially those from ZEF. They published with their supervisors from their theses and other research works. The ZEF interviewees also had a fair number of consultancies in which their supervisors were involved.

Interviewees who studied abroad also kept in contact with their supervisors, for instance Zea and Danie. Zea who did her PhD in Germany, reported that her supervisor still published with her and gave her consultancy opportunities on research related to Ghana.

It was observed that interviewees kept contact with supervisors no matter their professional field after PhD studies. However, those in research and academia had better opportunities and relations with their supervisors than those in NGOs and government agencies. Interviewees who studied on projects for their PhDs kept the closest and most beneficial contacts with their supervisors.

### **8.3 Post-PhD institutional collaboration**

In this subsection we report on the results on the form of collaboration interviewees maintained with the institutions during their PhD studies. These institutions supported them with their data collections, laboratory analysis and, in selected cases, the analysis of the results of their data. In addition, some of these institutions provided them with logistic support and relevant literature during their PhD studies. Almost all of the interviewees who studied abroad collected their field data from Ghana, except Harrie who collected his field data from South Africa (his country of study).

Out of the 20 interviewees, nine did not continue to keep contact with institutions which supported them during their PhD studies. The reasons for the lack of collaboration included interviewees having nothing to do with those institutions after PhD studies or a lack of cooperation on the part of those institutions:

Anje:

Forestry Commission I do but that's more of personal but not official also because of where I find myself now and then also at some of the networks I also undertook an online course on global sustainability with the university of Chalmers. Yes, so that I don't keep any links anymore (P16, 47:194).

Janco:

once in a while Because you don't have projects that are linked to them [those institutions] (P9, 43:143).

At the time of this research, 13 of the interviewees still kept some level of contact and collaborated with the institutions. Reasons for interviewees still keeping contact with the institutions included the need for extra data for their research, the development of a proposal because they still worked in the field and, in selected cases, they gained employment at these institutions during their thesis research (as in the case of Gert) or after their PhD.

Willem:

apart from going for data we've tried to put proposals together and it's not worked well for us (P2, 85:246).

Luan:

yes. Because some of them are colleagues now. Like ministry of fisheries their regional director here once a while because of our work we also go to know what they are doing and what workshops are available. As for CSIR water research, most of our external examiners or sometimes even assessment of staff promotion so that collaboration is there (P10,67:205).

David:

Savannah Agricultural Research institute was one, IWMI was one. we still collaborate like I just mentioned IWMI just came here and for SARI they even gave me an appointment but I didn't take it because I needed time to be able to do other things like for human capacity building I've got the time to do what I'm doing now, consult and do others but for SARI I will need to go there early in the morning, close at five and that kind of stretching (P17, 50:234).

Kai:

Because my supervisor back in the UK, Dr Sakani is from Burkina and he was working there. Mostly, it was all about equipment. So any time I needed something in Burkina Faso their seed centre I go call him. They had a lot of lab equipment. So anytime I was in need... when I came back anytime I need something, he will send somebody to bring me such an equipment for me to work with, then they will take it back (P18,54:246).

Most of the interviewees kept contact with these institutions because they worked in the same field. They therefore relied on these institutions for assistance when undertaking other research. Interviewees who still carried out research and taught in the field related to their PhD collaborated with these institutions. However, their collaboration mainly related to data assistance and logistic support. They did not collaborate on the presentations of their research findings or on development of articles for publications.

Literature on scientists' research collaboration shows that collaboration choices are governed by a wide variety of factors including inter-institutional structures (Landry & Amara, 1998), formal research (Wen & Kobayashi, 2001) and informal research networks, research alliances and covenants (Pisano, 1991), and arrangements for sharing expensive or scarce scientific resources and equipment (Kelves, 1995).

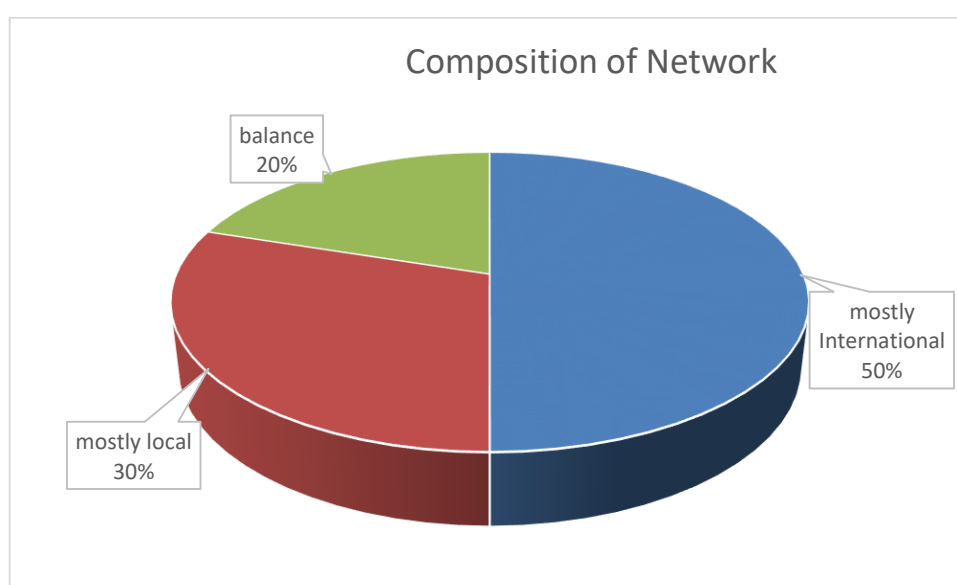
The present study found that the collaboration most interviewees had were governed by opportunities they derived from it. These opportunities included consultancies and conference attendance. In addition, apart from formal collaboration, as in being members of a body appointed by the university or government, most of the collaborations were informal. There were few research alliances of which interviewees were part.

## 8.4 Networks established and their relevance

Interviewees were asked about the type of professional networks they had before their PhDs (if it was mostly local, international or both), whether PhD studies played a role in the current professional networks, and whether these networks had improved after their PhD studies.

### 8.4.1 Network composition before, during and after PhD

The networks considered in this study were professional association membership, professional relationships with colleagues and institutional contacts. We asked interviewees if their networks were made up more of local (in Ghana) or international (outside Ghana) partnerships.



**Figure 8.2 Composition of network after obtaining a PhD**

Generally, 50% of interviewees mentioned that their networks comprised more international than local persons, for 30% the composition of their network was mostly local, and the remaining 20% had balanced networks, i.e. almost equally local and international (See Figure 8.2 above).

As expected, interviewees who had more international networks mainly studied abroad for their PhDs. In addition, these interviewees had consultancies with international institutions funding them. They also had the chance to attend a fair number of international conferences and had established contacts.

All three interviewees who studied at ZEF had international networks that aided the uptake of their research findings. They established the networks during their PhD studies and at the time

of the interviews, still maintained those contacts.

The same cannot be said about the UNESCO-IHE interviewees. Out of the three, one had a mostly international network. One had a balanced network, while the other one had a mostly local network. Their PhD programmes did not give the UNESCO-IHE interviewees enough international platforms to network with former colleagues and attend international conferences. Their programmes also did not give them many consultancy opportunities (linked to the PhD programme) after their PhD studies. Interviewees in academic careers had more international networks than those in other fields. Those working for government agencies had mostly local networks.

#### **8.4.1.1 Network composition: mostly local**

In this subsection, the researcher reports on interviewees who mentioned that their professional network after obtaining a PhD was mostly local. Their collaborations and other professional activities were done in collaboration with local institutions and not with international ones, although they reported having some international contacts.

Samuel:

That's it's more of a local network and occasionally some to international (P5, 28:119)

Gert:

I will say that at the moment it is more local based. because right now I just published with my students and with just two or three of my colleagues outside my institute. So at the moment it is more local. I haven't really started any serious international collaborations yet (P7, 44:198).

Luan:

in Ghana for instance the professional network is this Ghana science association which we attend the conferences I think biannually, every 2 years. Where we meet and then share ideas. And also we have Ghana animal science association which because of fish we identify ourselves with them. Even though basically they try to look at livestock but we felt that fish is also an animal so I think since 2010 I encourage some of my young colleagues and we joined them. Since then we've been meeting and then especially conferences. If you look at our conference the papers we presented at conferences Ghana animal science association and then (P10, 51:146).

Danie:

But I think when I was undertaken my PhD I had more of an international network but after school it's more local (P11, 40:208).

The interviewees in this subsection were in academic positions or involved in research and NGOs. Gert and Danie studied abroad for their PhDs. They maintained that during their PhD studies, they had mostly international networks but after PhD studies, these networks became

increasingly local. Their local network composition after obtaining their PhDs could be attributed to the institutions they attended and opportunities they had had after their PhD. Studying abroad gives one an international network composition during your studies and that network could be maintained after studies through collaborations.

Luan and Samuel studied in Ghana and did not have many opportunities to travel abroad to conferences related to their fields of study. They also did all their studies in Ghana and had worked in Ghana during and after their PhDs. They maintained mostly local networks.

#### **8.4.1.2 Network composition: mostly international**

Interviewees reported on in this subsection mentioned that they had built mostly international networks during their PhD Studies. They still maintained a predominantly international professional networks after their PhD studies. They were members of several international professional organisations and were involved in selected internationally funded projects. They have also had the chance to attend a fair number of workshops and conferences during and after their PhD programmes and have established contacts through those forums.

Zea:

PhD I was working with just one international organisation in Washington but after PhD it's more international especially with German based organisations it's easy for them to work with me. Because DAAD gives us opportunity to meet as past beneficiaries. I also belong to Africa group of networks so these are all networks. Sometimes somebody wants something done and then based on who knows you, you are recommended to them. Recently for example there is a colleague who works with Evergreen Growth Initiative. It was started by someone who came back Cottbus, the University I undertook my PhD and I knew him from Germany and I recommended him. So if there is a project they think first whom do I know somebody like Dr Edward Nunoo so the people that you met during you PhD (P12,51:275).

Harrie:

the network is more international because of the people that I met in South Africa who were in the field, who are still in the fields. We continue to communicate (P1, 76:133).

Willem;

yeah it's more of international network (P2, 99:186).

Jan:

My international network looks much stronger (P3, 67:75).

Ruan:

no. It's become better international. I think even the local has dwindled because I might say that since I came back, I've not really tried to reach out. I'm just been very much here in my office really orienting myself but I've gotten international invitations to do things. For example, like this conference that I attended in South Korea. I was invited to join the team, international



tropical team to go and give a presentation and then also I was asked to chair a session by the global fire monitoring team in Germany (P13, 35:145).

Zonja:

after PhD I will say it's international. Because since 2004 November, I have been part of a project based in the African Union, African bureau for animal resources. I remember they said they saw my profile online, they contacted me, they have an aquaculture fisheries project which I am now part of the working group (P15, 46:205).

Anje:

I'm now trying to build the local networks especially through the projects I'm working on because it's my first place of work in Ghana and it's really working to build but the rest has mostly been key to university campus and the people you know but when it comes to the real system itself, the ministries, the big agencies like the water resources commission, the Ghana water company it's here that I am building all those networks and platforms but I also think that it's the way I started. I started doing the PhD work and there were much opportunities for travel so you go, you meet people, you exchange email addresses with them. You know at another time you even have some of them sending you some information about a conference that might interest you and if they send you can easily get this. Somebody sending you a link that you can easily get some free journals from this website and use for your work. So I think the networking has been (P16, 39:152).

David:

... currently it is both local and international. Before my PhD, like I said I also schooled in Japan so then it was still international and local but then the international component really keeps on increasing with time and compared to the local component well basically virtually do not exist (P17, 40:192).

Kai:

It's very international because through Royal Botanical Gardens (RBG), we have been doing a lot of projects. I have been doing a lot of work with Royal Botanical Garden. And RBG also has a lot of connections with seed centres here in Africa. So we have a strong link with Burkina Faso, Kenya, Tanzania. So I have been going to Kenya and Tanzania to their seed centre. For workshops and other things. To Burkina Faso for workshops. So it's international (P18, 40:163).

Nigel:

If you want work related to my PhD then I think that's more international than local (P21, 37:118).

Except for Anje, who studied for her PhD in Ghana, all interviewees reflected in this section, studied for their PhDs abroad and worked in academic and research institutions. They built very good contacts during and after their PhD studies. At the time of the present study, they were also members of selected international societies and professional bodies in their fields.

Anje, who studied in Ghana, had international networks because she worked with an international institution after her PhD and also had opportunities to attend nine international conferences during her PhD studies.

#### **8.4.1.3 Network composition: balanced**

Some interviewees maintained networks that are both international and local:

Piet:

it was more Ghana. Now it is difficult to tell. Because the outside networks, the people are not many but their impacts or influences are almost the same. Almost equal to the Ghana one (P6, 38:102).

Lenny:

I think it's both. Okay (P8: 32,137).

Janco:

my network is equally local and international (P9, 26:97).

Kai:

I will say international. Both, I will say. Now at least I believe that so far as cocoa issues are concerned, I am easily called upon, people come to me ... we heard that you're working with cocoa, and those things, even though they come before I tell them it is on pollination. And those who are not interested will not ... So that is it. But more internationally, I get a lot of responses, a lot of comment from people. That I think is what is helping (P19, 33:212).

Piet, Janco and Kai all studied in Ghana for their PhD studies. However, during their studies, they had the opportunity to undertake part of their research work at a university abroad. During that period, they established contacts with colleagues in the field and became members of international professional bodies.

Although Lenny studied abroad, he dealt with local stakeholders in the field because at the time of the interviewees, he organised meetings with these stakeholders to disseminate findings on a project that was funded by the Dutch government where he studied.

The study therefore noted that the composition of networks is affected by several factors, including the field where one worked after obtaining a PhD, membership of professional bodies, and the opportunities one gets after obtaining the PhD. The professional fields did not really affect the composition of one's network(s).

#### 8.4.2 Benefits of networks

Interviewees were asked about the benefits they have derived from the professional networks they have established after obtaining the PhD. In this regard, questions were asked to establish whether these benefits had assisted in the uptake of interviewees' thesis findings and recommendations.

Gert and Zea mentioned that the networks they had established after obtaining their PhDs had given them consultancy opportunities.

Gert:

like I told you I teach part-time at the civil engineering department and I meet students who are mostly major level professionals. Some will say o we have this consultancy, can you come and help us with it. Things like that. And it's not the only place I teach. I teach at the zoom lion institute also (P7, 45:204).

Zea:

PhD I was working with just one international organisation in Washington but after PhD it's more international especially with German based organisations it's easy for them to work with me. Because DAAD gives us opportunity to meet as past beneficiaries. I also belong to Africa group of networks so these are all networks. Sometimes somebody wants something done and then based on who knows you, you are recommended to them. Recently for example there is a colleague who works with Evergreen Growth Initiative. It was started by someone who came back Cottbus, the University I undertook my PhD and I knew him from Germany and I recommended him. So if there is a project they think first whom do I know somebody like Dr ENX so the people that you met during you PhD (P12, 51:275).

To Ruan who was a research scientist with CSIR at the time of the interview, her international network has not helped in the uptake of her thesis and other research findings but rather helped her in carrying out further research:

The networks have not ensured uptake but maybe further research. But uptake I think it's mostly and probably locally (P13, 45:173).

She noted that for her thesis uptake, it is her local network that is helping her. Her local network, made up of her colleagues from other government regulatory bodies, the universities and the local professional bodies were giving her that opportunity to make her findings known. To a large number of interviewees who have built good networks during and after obtaining their PhDs, the networks gave them the opportunity to present their research findings at appropriate conferences and workshops. In addition, the networks, which included their supervisors, allowed the supervisors to recommend their research including their theses, to other researchers, including postgraduate students.

Harrie:

the other guy we used to be together in UWC, but the other ones I've not met so it was through this research chapter sometimes when you meet outside of the conference and then you share ideas so it helps you to at least get to know people who are doing other things, sometimes you get mails about someone who wants to do something in this area they need a little bit of advice because they know you've done this before (P1, 51:137)

Willem:

sometimes you are invited to do a presentation. Or you are invited for a workshop and you are asked to do some presentation. Sometimes you go into a workshop and you look at whatever is going on and you go on to assist. Invariably you are not the moderator but sometimes based on your presentation you become the moderator. So you chip in some methodologies and some ideas that you have (P2, 66:192)

Piet:

Professor Cudjoe for example my professor who remains my network has recommended my thesis to a number of people and those people have actually called me from RIPS and ISSER. Said o well we were recommended to look at you work and just a few questions and advice (P6, 40:108).

Luan:

in Ghana for instance the professional network is this Ghana science association which we attend the conferences I think biannually, every 2 years. Where we meet and then share ideas. And also we have Ghana animal science association which because of fish we identify ourselves with them. Even though basically they try to look at livestock but we felt that fish is also an animal so I think since 2010 I encourage some of my young colleagues and we joined them. Since then we've been meeting and then especially conferences. If you look at our conference the papers we presented at conferences Ghana animal science association and then (P10, 51:146).

Kai:

Yes. Mostly when we had some workshop on seed conservation. And I was a major contributor. Even though it was organised by RBG, millennium seed bank. My background helped me so much. Because most of the guys who met there were not in the area of seed. They were just in the area of plant science, but they needed to work on seeds. Some guys from South Africa and others. So I did a lot of contribution. Personally, sometimes those guys call me on specific species. How to handle them. Sometimes I give them some insights (P18, 41:165).

Nigel:

yes. IWMI. I think it's because I'm on this project IWMI slowed down on me. But once they, got to learn that I was finishing they were bringing me another project which was going to run for 4 years so they have expressed a lot of interest (P21, 49:168).

For Anje and David, the networks they had locally after obtaining their PhDs have not given them any consultancies and have also not ensured the uptake of their research findings:

Anje:

I'm not too sure not really. I did consultancies but it was not paid, I just did them for free and that was when I was working here (P16, 40:156).

David:

These networks have ensured to a limited extent the uptake of my thesis findings and other output. Not so much (P17, 41:193).

Generally, the local networks gave interviewees the opportunities to present their research findings at selected workshops and conferences. During these conferences, they also shared the knowledge they have produced from their PhD and other research. Interviewees in academic work and research were the ones who benefited mostly when presenting at these workshops. Interviewees in consultancy and NGOs did not gain much benefit from their local networks.

The international networks gave interviewees the benefits to gain more consultancies by involving them in relevant research both locally and internationally. In addition, the international networks gave them the opportunities of presenting their findings at international conferences.

Overall, these networks (local or international) did not promote publications, writing of joint proposals, and research fund raising activities. These networks did not look at avenues of undertaking research together. In summary, the networks did not really enhance the uptake of theses and other research findings.

Recent literature on national systems of innovation depicts intensive scientific collaborations between universities, industrial organisations and government agencies (Etzkowitz & Leidesdorff, 2000; Etzkowitz *et al.*, 2000), and argues that university research may increasingly function as a locus of national knowledge-intensive networks.

## 8.5 Summary

In terms of interviewees' contact with their supervisors, the study found that most of them kept in touch with their supervisors and it did not matter where they undertook their PhD studies. In addition, although some interviewees did not work in their field of PhD studies anymore, they still kept contact with their supervisors. Their professional field after obtaining a PhD did

not affect their contact with their supervisors.

The study also noted that supervisors had been mentors to them in their post-PhD career development. The supervisors had also given them opportunities after their studies. Keeping contact with one's supervisor after obtaining a PhD thus ensures some mentorship. It keeps one in the field, and by extension ensures some level of uptake of your research outputs especially your thesis outputs.

Interviewees who studied in Ghana kept some contact with supervisors but it was mostly on a casual basis. Except for two interviewees, supervisors were not involved with their students in terms of publishing or giving them opportunities after they had obtained their PhDs.

The study observed that interviewees in research and academic positions had better opportunities and relations with their supervisors than those in NGOs and government agencies. Interviewees who studied on projects for their PhDs kept the best and beneficial contacts with their supervisors.

Most of the interviewees kept contact with these institutions that they collaborated with during PhD studies because they worked in the field. They therefore relied on these institutions for assistance when undertaking other research. Interviewees who still carried out research and were teaching in the field related to their PhD still collaborated with these institutions. However, their collaboration mainly had to do with data assistance and logistic support. They did not collaborate on the presentation of their research findings or on development of articles for publications

The study found that the collaboration most interviewees had was governed by opportunities they derived from it. These opportunities included consultancies and conference attendance. In addition, apart from formal collaborations, as in being members of a body appointed by the university or government, most of the collaborations were informal. There were few research alliances of which interviewees were part.

The study observed that interviewees, who studied abroad and maintained membership of international professional bodies during and after obtaining their PhDs, had mostly international networks. If one worked post PhD in the same field of his or her PhD research he or she is likely to maintain membership of network after obtaining PhD.

Generally, the local networks gave interviewees the opportunities to present their research findings at selected workshops and conferences. During these conferences, they also shared the knowledge they had produced during their PhD studies and other research. Interviewees in academic positions and research were the ones who benefited from presenting at these workshops. Interviewees in consultancy and NGOs did not have much benefit from their local networks.

The international networks gave interviewees the benefits to form more consultancies by involving them in relevant research both locally and internationally. In addition, the international networks gave them opportunities to present their findings at international conferences.

The present study therefore concludes that collaboration with institutions after obtaining a PhD was not the best. In addition, the composition of networks is affected by several factors, including the field within which one worked after obtaining a PhD, membership of professional bodies and the opportunities one gets after PhD. One's professional field does not really affect the composition of one's network(s).

Overall, in the case of these interviewees, these networks (local or international) did not promote publications, the writing of joint proposals, or research fund raising activities. These networks did not look at avenues for undertaking research together. In summary, as reported by the interviewees, the networks did not really enhance the uptake of thesis and other research findings.

## **8.6 Conclusion**

As far as post-PhD collaboration and contact is concerned, the expectation is that the supervisor remains a mentor and someone who will advance your career. In some countries, this is indeed seen as part of the role of the supervisor – in other countries not. Many of the interviewees indicated that their supervisors retained contact with them and this served as a referral for consultancy. It almost seems as if the interviewees indicated that it was more important to them to get these consultancies than other forms of collaboration. There seems to be a distinct difference between having formed international versus local networks as the latter seems to be more instrumental in advancing the uptake of research findings.

Institutions in Ghana which offered PhD students support during their studies seem not to be interested in the outcome of their research. The findings and recommendations of the PhD

research are seen by these institutions as irrelevant. As Garforth and Usher (1996) notes, models of research management process suggest that the main determinant of relevance is the care and collaboration with which the research goals are determined and research implementation is monitored and managed. The situation above is different from institutions abroad where in most cases they demand of students who come to their institution to present their findings to them. Institutions not showing interest in doctoral research do not encourage students to communicate and disseminate their findings to them and by extension do not enable PhD holders to use their institutions as a platform to optimize the uptake of their findings. The results above suggest that research institutions and universities in Ghana are not particularly interested in doctoral research findings but only in the qualification.

Across all categories- research, academia and NGOs - the composition of ones' network during and after PhD studies depends on the opportunities one gets. However, the local networks did not offer much opportunities for the PhD holders to optimize the uptake of their findings and recommendations. The above can be attributed to the challenges local networks (including professional bodies) have in funding their activities that could have helped researchers communicate and disseminate their findings on a larger platform. Most of these networks depend on funding from foreign donors and the private sector to fund their activities.



## CHAPTER 9

### CONCLUSIONS AND RECOMMENDATIONS

#### 9.1 Introduction

The chapter discusses the contribution the study makes to doctoral studies in the field of ENRS and the uptake and impact of findings from doctoral theses. Additionally, the chapter discusses the contribution the study has made to the body of knowledge as well as recommendations to university administrators, researchers, PhD students and policymakers on how doctoral research recommendation uptake can be improved. The chapter concludes by pointing out the limitations of the study and suggests areas that require further research.

#### 9.2 Overall relevance and value of doctoral studies in the field of natural and environmental sciences in Ghana

This section summarises the findings on the relevance of doctoral studies in general and in the field of ENRS:

1. The relevance of PhD studies was identified first by the reasons and motivation for which people undertook PhD studies. Most of our interviewees had two main motives for undertaking PhD studies: improving their professional horizon and employment motives. Their motivation was not merely to add new knowledge to already existing body of knowledge. The knowledge production motivation was the only reason that had a direct impact on the utilization and uptake of findings and recommendation. The reasons interviewees gave for undertaking PhD studies vary. Undertaking PhD gives one the exposure needed in his or her professional career, and also builds their research skills. The interviewees also mentioned networking as a major factor for undertaking their PhD abroad. However, results from the study shows the demand for PhD is rising with people who are not even in the academia and research professions also acquiring PhD degrees. People who worked in academia and research institutions undertook PhD because of the change in appointment policies of their respective institutions. The study found that those interviewees who believed that they had produced new knowledge from their studies would push for the uptake of their findings and recommendations.
2. Undertaking a PhD outside Ghana did not necessarily guarantee some level of research uptake during or after PhD studies. The field of ENRS is a broad field and throughout the study, it was identified that most of the interviewees undertook their

studies “in a slightly “different sub field which however, fitted into the broader field. This does not make them specialists in a subfield.

3. The selection of supervisors for the interviewees were influenced by three major factors: location of study; source of funding for the study (that is if one was on a scholarship); and if one was undertaking his PhD studies on a project. Students who had supervisors recommended to them under a project, maintained very good relationship and collaborated with the supervisors’ years after they graduated and that relationship helped in the uptake of their thesis findings.
4. Overall, adequate funding was the main challenge for more than half of the interviewees. These bottlenecks have an impact on the outcome and outputs of the research produced at the end of their studies, and by extension the utilisation of the findings and recommendations of the thesis. For those who did research in physical sciences, access to long term data for their research was a major constraint during their studies. Interviewees who studied abroad but had to do their laboratory analysis in Ghana found it difficult to get adequate equipment from CSIR and access to their institutions’ laboratory. Lack of coordination by sponsors for those on projects was a problem identified with those who studied under projects.
5. The overall value of acquiring a PhD does not seem to be associated with their motivations to undertake a PhD study. Whilst their main reason for undertaking a PhD included to broaden the horizon in the field of their profession, enhance knowledge and ensure continuity in the field amongst others, their overall values of having a PhD was not to produce more knowledge but rather the opportunities and recognition that came with having a PhD in the society they found themselves. The above affects knowledge uptake since PhD holders would not seek to contribute new knowledge in the field they work but look out for recognition and opportunities which are not in line with knowledge production.

### **9.3 The extent to which doctoral research outcomes are recognized by scholars, scientists and policy makers**

Besides understanding why people undertake PhD studies and the major outputs produced from PhD research work, the thesis needs to be utilized by end users. The end users include scholars and scientists in the field or related fields, students and policy makers. This subsection summarizes the findings on the extent that theses are recognized after publication:

1. The major output from PhD theses across all professional fields were refereed journal articles. Most PhD holders in the field of ENRS do not publish books and policy briefs

(even when their research was to inform policy and practice). Interviewees who now work as researchers produced fewer publications than those currently in academia. PhD graduates who work in other fields different from their PhD research did not publish much after their studies. Most published articles were in international journals with very few articles in local journals. Generally, outputs from the PhD theses had poor impact as evidenced by the relatively low number of citations received.

2. As far as citations are concerned, the most highly cited PhD thesis was undertaken in an emerging field and also under a well-funded scientific project with the interviewee working in the same field after his PhD studies. Having a PhD abroad does not necessarily affect the citations to the thesis but the relevance; quality and availability of the theses online. Overall, there was poor uptake (citation) of theses from Ghanaian universities. That can be attributed to the unavailability of theses online, at departmental level and at the university libraries.
3. As far as conference presentations are concerned, the interviewees who presented their findings at conferences did so during the final year and just a year after PhD studies. Interviewees who presented the findings at conferences during their studies did so because it was a requirement of their university or the scholarships they obtained for their studies. Scholars in the field presented at conferences which were not related directly to their field of study, hence, the feedback was poor. Also, because the field of ENRS is very broad, there is the tendency for participants not to cooperate during conference presentations if the thesis research is more technical and especially presented at a social science related conference.
4. PhD graduates only had knowledge of the uptake of their thesis if they were involved in projects directly linked to their PhD. Most researchers believe the implementation or uptake of their thesis recommendations should not be their responsibility but rather that of the government officials they meet at workshops, conferences and different forums. To them, they can only discuss the knowledge they produced from their PhD research with government officials and at most produce documents for them. Thesis recommendations can be taken up if the author is involved in a project or policy activity.
5. There seems to have been reasonable uptake of thesis recommendations amongst those interviewees who work in research and academia. Those recommendations are communicated to post-graduate students for their thesis. In addition, those who are involved in consultancies make those recommendations to policy makers and donors.
6. Most of our sample in the field of ENRS were co-authors as far as their post-PhD research outputs are concerned. Most interviewees carried out less independent research after their PhD.

7. Most young scientist who completed their PhD within the last 6 years has at least one publication in a predatory journal. Most of these researchers who had published with predatory publishers are in academia and research. Most of the interviewees had learnt about predatory journals in the last 2 years but did not really understand what predatory journals really are. The major reason for interviewees publishing with PP is that, their manuscripts were not meeting the requirements needed to publish with established journals.
8. Most researchers had poor to average knowledge of various citation databases with most of them knowing Google Scholar, and those who studied abroad having heard of Scopus. Most researchers in Ghana have no knowledge about the Web of Science. It was therefore not surprising that we found that they do not monitor the citations to their theses and other research output. The poor knowledge and understanding of how to monitor their publications affected the importance they seem to attach to the uptake of their research. No matter what their professional background or knowledge of citation databases, most of the respondents did not see it as important to monitor citations to their PhD works. They also had less understanding of the importance of citations to their professional careers and their institutions' visibility
9. On the limitations of research uptake in the field, researchers believe moving from the field one pursued for his PhD after studies, gives one low uptake of findings. Lack of data, unavailability of tools for analysis, and the volume of work in ones' professional field were identified as factors that can limit the uptake of research findings. Appropriate mechanisms laid down by institutions for the dissemination of research findings can help address some of the selected limitations of research uptake.

#### **9.4 Mechanisms for knowledge dissemination, uptake and influence for doctoral research in Ghana over the past 15 years.**

1. Whilst most researchers and scientists in research and academia believe the knowledge gained from their PhD studies is helping them in their professional career, most of them mentioned that there have been a poor to fair uptake of their findings at all levels. The poor uptake is because most institutions including the CSIR and the universities did not have an institutional policy to ensure PhD research findings and subsequent research (publications) by interviewees. Creating appropriate platforms for the dissemination of research findings; Involving governments in research; development partners involvement; making research findings practically relevant to developmental challenges; and making publications clearer to end users were the ways interviewees suggested can help maximize the uptake of research findings.

However, interviewees suggested that the private sector is mostly the end user of the knowledge products developed by the research institutions and they also have the money to transmit the technology developed.

2. Concerning knowledge of thesis uptake, the study found that most people who work in research and consultancy after PhD did not have any idea if their findings are being used by stakeholders or end users. Although they monitor the policy processes and other activities of government ministries and departments in their field, there was no evidence that their PhD studies are considered in these activities. However, those in research and academia who have been involved in some consultancies by government and other agencies have seen a fair level of uptake of their theses findings and recommendations. These are also mostly in the field of water resources and forestry.
3. Our typology of interviewees (distinguishing between academics, researchers and consultants) showed that most of the academics teach in the field of science and engineering. Most of the academics and researchers are currently working with institutions they were in before their PhD whilst others also established some contact with their current institution during their PhD studies. The consultancies undertaken by the interviewees are all locally based (in Ghana) with collaboration and funding mostly from international institutions. All academics are lecturers in Ghana but few are visiting scientists or scholars to other universities abroad. Unlike their colleagues in academia who mostly consulted in the field of social sciences, those in research undertook consultancies mostly in the pure sciences in the fields they worked in during their PhD studies. This seems to be related to uptake of their PhD findings. The opportunities they find post -PhD helped in the utilization of their PhD research findings.
4. Interviewees who did some work directly for government described themselves as policy analysts. Researchers with CSIR described themselves more as consultants than researchers. Academics see themselves more as lecturers but also mentioned that they work as consultants and researchers as per the policy of the university. Those in academia described themselves based on conditions of their employment. The way most interviewees defined themselves seems to be somewhat related to the uptake of their research findings. The PhD holders who considered themselves as generalists noted that been a generalist affects the uptake of what they studied at the PhD level. Being a generalist does not allow one to specialise in any subfield and does not ensure continuity in the field thereby affecting the uptake of knowledge and findings from PhD studies.
5. Most PhD holders envisage their profession developing in the next 5 to 10 years; those in academia who have had some consultancies wants to remain in the field and publish more. They believe publishing more can ensure that their research will be utilized by

end users. They want to remain in the same institutions to support the development of the field. They also want to train more post-graduate students in the field and make sure their research benefits key stakeholders at the community level. In addition, they see the field of ENRS as a broad field, therefore research in the field is not coming to an end anytime soon, therefore their reason to remain in the field.

6. Keeping contact with supervisor (s) after PhD ensures some mentorship. It keeps one in the field and by extension ensures some level of uptake of their research outputs especially their theses outputs. The study found that the collaboration most researchers had were governed by the opportunities they derived from it. These opportunities included getting consultancies and conference attendance. The local networks give interviewees the opportunities to present their research findings at selected workshops and conferences. During these conferences, they also contribute with the knowledge they have produced from their PhDs and other research.

## **9.5 Conclusions of the study**

Based on the findings from the study, the following conclusions have been drawn:

1. The reasons one undertakes a PhD has a direct impact on the uptake of thesis recommendations and findings. People, who undertake PhD to produce new knowledge are more likely to optimize the uptake of their findings several years (even after 8 years) after completion.
2. Research and academic institutions in Ghana are following the trends in higher education employment worldwide by recruiting candidates with PhDs. They believe such strategies will improve the quality of teaching and research and also improve the image of their institutions worldwide.
3. Most researchers and academics publish more refereed articles because those are the ones mostly considered during their evaluation for promotion.
4. PhD holders outside research institutions and universities blame those institutions for creating the gap between research and policy and practice.
5. Most PhD holders presented the findings of their theses at conferences because it was a requirement of their university or the scholarships they obtained for their studies.
6. Selected interviewees made some efforts to communicate the findings of their thesis to policy makers however most PhD holders in the field of ENRS do not personally ensure the uptake and utilization of their thesis findings. Most interviewees have less interest in their PhD thesis after graduation.
7. The job trajectory for most of the interviews did not encourage the uptake of their PhD thesis research.

8. The study concludes that collaboration with institutions after PhD was not the best. It did not allow for the uptake of theses and other research outputs. Interviewees in academia and research still collaborated with these institutions on a more personal basis.
9. Interviewees are not interested in the impact their publications are having or receiving. Interviewees did not see it important to track/check whether their research has been used or cited.
10. Whilst universities and research institutions claim ownership of the research findings they believe it is the duty of government to optimize the further uptake and utilization of the findings and recommendations into policy.
11. There is no systematic attempt on the part of researchers to monitor the uptake and citation impact of their research findings.
12. There is little awareness and appreciation of the need for uptake of research findings to policy and practice.
13. Some of the interviewees do not actually believe that their PhD prepared them for a topic of specialisation.
14. The major factor that makes PhD holders in Africa wanting to end up in academia is to accomplish their primary motivation of undertaking PhD and to become lecturers or researchers with public institutions
15. Consultancy opportunities are not necessarily an appropriate way for interviewees to optimize their research uptake.
16. Private sector and industries are good avenues to optimize uptake of thesis findings and recommendations
17. Interviewees are in the field because they see the field as broad and also with many opportunities for consultancy and not necessarily to ensure the uptake of their recommendations and findings
18. When researchers work in the broad field of ENRS and do not specialize in subfields, it does not ensure research accountability, a major problem for the African research system.
19. There seems to be a distinct difference between having formed international versus local networks as the latter seems to be more instrumental in advancing the uptake of research findings.
20. Research institutions and universities in Ghana are not particularly interested in doctoral research findings but only in the qualification.
21. Across all categories- research, academia and NGOs - the composition of ones' network during and after PhD studies depends on the opportunities one gets. Local networks (including professional bodies) have challenges in funding their activities that



could have helped researchers communicate and disseminate their findings on a larger platform.

22. Uptake should be promoted in the doctoral value chain in Ghanaian universities and the entire science system as a whole. A typical example can be to make a policy recommendation and technical notes part of the thesis format; for supervisor to guide the student to focus on research outputs and summative assessment report to assess in what way the student already participated in research uptake.
23. Supervisors should be trained to understand the different aspects of the doctoral value chain-uptake (transfer). The above is one activity neglected/overlooked in the entire research and university training structures in Ghana.

## 9.6 Recommendations

The following recommendations are made:

1. Universities and research institutions in Ghana should have interest in the new knowledge generated from doctoral research in all fields. And those universities should recognize that doctoral research is main integral part of the institutions research system.
2. PhD students should be given the required platforms to communicate their findings during and after their studies.
3. To ensure the uptake of theses further recommendations, it is recommended that PhD holders are made to teach and supervise mainly in the field they undertook their PhD.
4. While it will be difficult to regulate consultancies of research and academic staff, efforts should be made by their institutions to ensure they undertake consultancies that are in line with their field of specialisation to optimise uptake of their findings.
5. The notion of being employed mainly by universities and research institutions after obtaining a PhD should change. These institutions should recommend PhD holders to the private sector and industries for internship and employment.
6. The promotion policies of universities and research institutions should change to include the impact of staff research outputs as that will ensure some level of uptake.
7. PhD holders should be encouraged to be part of professional networks. However, their main motive of joining these networks should be to communicate their findings for possible uptake.
8. Universities should not only pay lip service to the importance doctoral education plays in their research system. Doctoral education should be well defined including creating appropriate platforms and well defined mechanisms for the communicating and possible uptake of their findings.



9. Capacity of staff from universities and research institutions as well as doctoral students should be built on the current issues on publications and citations.
10. Systems should be put in place in universities and research institutions to engage stakeholders constantly on research findings. Research accountability should be a concern for all universities to ensure possible uptake of research findings and recommendations.

### **9.7 Limitations of the study**

Issues of research uptake have mainly focused on the translation of research directly into policy (Carden, 1999). Most of these research uptake mechanisms have not focused on the outcome of research to improve practice. In addition, doctoral research outputs have not been evaluated to assess the impact on policy and practice. Experts in the field of research evaluation have also not focused their work to include doctoral research. The above made the availability of literature in the field of knowledge uptake very rare. Again, the earlier works on uptake have been on nursing and medical research uptake and not in the field of ENRS. In addition, less work on research uptake has also been done and in few cases by NGOS such as the International Water Management Institute amongst others. The lack of publications on the uptake of ENRS made access to relevant literature on the matter very difficult for doctoral research amongst others.

The study on the whole was limited to PhD research work conducted by Ghanaians in universities both in Ghana and abroad but focused on a research problem in Ghana. The focus of the study was also on research conducted in the field of ENRS and was limited to the last 15 years. The above gave the study a small scope in terms of comparison to other fields and even selected subfields in the field of ENRS. On duration of post PhD years, although the study set a target range of 15 years, most of the interviewees had an average of 5 years post PhD and that may be suggestive to others that 5 years may not be appropriate to measure the impact of the uptake of research findings.

The study initially wanted to focus on PhD research conducted in the two main public Ghanaian universities (KNUST and UG). However, most of these universities did not have the soft copies of PhD theses of work (especially research completed from 2000 to 2010). The above resulted in the fact that the focus of the study was on all doctoral research conducted on Ghana by Ghanaians between that period but obtained their PhD from other universities outside Ghana.

### 9.8 Future research

This study is the first to focus mainly on the uptake of doctoral research work in Ghana. In addition, the study was on research done in Ghana and focused mainly on efforts the PhD author made by himself/herself to ensure the uptake of his/her research findings. The study focused mainly on the field of ENRS.

Based on the findings and recommendations made in this study, any future research on doctoral research uptake should:

1. Have a narrower scope in terms of the field. The study should focus on a subfield in ENRS. This will help know better, the subfields in ENRS that have good uptake
2. Investigate the uptake of doctoral research in other fields relevant to Africa's development challenges such as medicine; agricultural and public health.
3. The role of the private sector in ensuring the utilization of doctoral research findings in their field of work.
4. Bibliometric study of doctoral publications in Ghanaian and African universities.
5. The nexus between African "WCU" and doctoral research uptake.
6. The role of doctoral research uptake and the new mission and vision of African universities.

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## APPENDIX 1: SAMPLE OF INTERVIEW GUIDE

### Questions:

1. Let us talk about your PhD studies first. Why did you undertake PhD studies; what was the motivation and notion?
2. Why did you choose a PhD in this field and not another field?
3. Did you ever consider going abroad for your studies?
4. How did you select your supervisor?
5. How long did your doctoral studies take? Were you able to study fulltime or were you working while you were studying?
6. Will you have loved to have done the PhD earlier?
7. Your thesis has received NO citation after being published online. DO you recommend your work to your students and other researchers? Do you talk about your PhD thesis to colleagues you meet at conferences and others?
8. Have you presented the findings of your research at any workshops/conference; where were these conferences? How was the feedback?
9. You published the following articles from your PhD:

1. -----(2013). Sustainable utilization of Groundwater Resources under Climate Change: A case study of the Table Mountain Group Aquifer of South Africa in Singh, B.R.(ed). Climate Change-Realities, Impacts over Ice Cap, Sea level and Risks. INTECHOPEN.COM. (Book)

2.----- (2011). Groundwater and Health: Meeting unmet needs in Sub-Saharan Africa. In J.A.A. Jones (ed.) Sustaining Groundwater Resources, International Year of Planet Earth. DOI 10.1007/978-90-481-3426-7\_2. Springer Science Business Media B.V. 2011. (3 citations)

3. -----2010). Sustainable Utilisation of Groundwater in Southern Africa. Stakeholder guide for SADC WaterNet Chair in Water and Society. ( not available online)

- i. Are all the above publications linked directly to your PhD thesis and did you publish any other outputs which are not stated here?
- ii. Three (3) out of five (5) publications from your PhD ,the two (2) in international journals cannot be found online? Any reason?

- iii. Why did you choose to publish in these journals; who made the recommendations of these journals to you?
- iv. Did the publishers write to you to publish with them and at what fee?
- v. Did you receive reviewers' comments on your articles before publishing?

10. Now, let us discuss your PhD thesis: Your study made several recommendations to policy and practice. One specific recommendation was:

“• Evaluation of long-term rainfall pattern for the area under study for trends. Some other measures are important after the commencement of the scheme to ensure sustainability.

- It may be important to set limits to water level declines which may be different for each season in order to guide the review of abstraction rates and also allow declining water levels to recover.

- It will always be preferable to set low abstraction rates that can run continuously for a longer period as opposed to high rates for shorter periods. The latter puts more stress on the boreholes.

- Monitoring of water levels and water quality by periodic sampling and analysis.

- Setting up and monitoring of observation boreholes near potential sources of impact is essential.

- Implementation of adaptive management practices as experience is gained and challenges become evident. Management must be willing to accept realities of challenges and not be motivated only by demand targets. With the reality of global climate change and its impacts on freshwater resources, mitigation and adaptation measures must form an integral part of sustainable utilization of freshwater resources particularly groundwater in this semi-arid region of the developing world”.

The above recommendations were intended to improve policy and practice in your field of research.

- (i) As far as you are aware were any of these recommendations taken up by any person or institution? Was there any interest in government or elsewhere in these recommendations? If not – why? Do you still believe today that these issues are important? Elaborate
- (ii) Have you been in a position or known anyone who could have facilitated the uptake of the recommendations of your PhD thesis?

- (iii) On the recommendations of further research, you work with students at the university, have you identified possible students who could work on similar issues?
11. After your PhD, you have published three (3) Journal Articles; three (3) CSIR Technical notes and three (3) Project reports? How did you select the journals? Did you receive reviewers comment and did the publishers request some money from you?
  12. Have you heard of Predatory Journals? When and from where?
  13. You also seem to be publishing less after your PhD?
  14. Why do you have the same co-authors in most of your publication and what are their specific roles in the projects?
  15. You have had some consultancies after PhD, tell me about them. With which organizations and are/were they in line with your PhD? How did these opportunities come about and do you think your PhD may have contributed to all these consultancies?
  16. What has been your research and professional network during and after your PhD and have they been helpful in the uptake of your research?
  17. What is the nexus of your job trajectory after your PhD studies?
  18. You seem to work in a broad field of ENRS instead of your field you specialized in your PhD?
  19. Overall, what has been the uptake of your PhD?

**General questions:**

20. What do you think are the best ways that academics can maximise the uptake, use and impact of their research findings?
21. What are the most significant bottlenecks you encountered during your PhD research and in your current career?
22. Do you monitor the uptake/citations of your thesis publications and your other research outputs? If so, How?
23. Has your professional career after your PhD studies helped in the uptake of your PhD research?
24. Did you collaborate with relevant institutions and researchers during and after your PhD studies?
25. Have you had many enquiries from different stakeholders about your PhD studies?
26. What do you see as challenges to PhD research in the field of ENRS? What about the uptake of the findings; does your organization have a method to ensure uptake?

**General questions to end all interviews:**

27. How do you define yourself today? As an academic/ a scientist/ a consultant/ researcher/ policy analyst? Any other description?
28. How would you today describe the value of your PhD? Knowing what you know now – would you have chosen the same topic/ same university?
29. How would you describe your career since your PhD? Has it basically built on the PhD as a kind of platform or has it gone into very different trajectories and directions? And if so, was this by choice or mostly by accident and opportunity?
30. Where do you see your career developing in the next 5 – 10 years?