The Future of Postgraduate Education and Training in Ghana

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Abstract
Ghana’s postgraduate education and training has not made visible impact in the country’s drive to sustainable development. The purpose of the paper, therefore, was to initiate a policy-oriented discourse on the future of postgraduate education and training in Ghana. The discussion is ultimately aimed at identifying strategies that can be implemented to make postgraduate education and training more resilient and competitive in an increasingly globalising world. The data used in the paper were obtained through a review of published scholarly works, reports and government documents. The secondary data was complemented with views from some of the Vice-Chancellors and past Vice-Chancellors of public universities in Ghana. The views of the Deans of the schools of graduate studies and Professors who have had experiences in postgraduate education and training in these public universities in Ghana were also considered. The results show that postgraduate education and training in Ghana has been undermined by a number of barriers, including limited institutional capacity, weak collaboration for research and development, limited funding, problematic retirement policy and continuous re-acclamations of doctoral lecturers. These barriers have culminated into poor visibility of postgraduate education and training institutions in Ghana. The ability of the institutions to undertake problem-based research to address pertinent societal problems has been weak. The paper concludes that postgraduate education and training in Ghana can drive the process of development if the relevant higher educational institutions are enabled and transformed to become leaders in postgraduate education for holistic capacity building.

Keywords: Higher education, research, capacity building, national development, Ghana

1. Introduction
In this paper, the term postgraduate education and training has been used to refer to masters or doctoral studies including certificates and diplomas that are taught to a more academically demanding standard (Higher Education Policy Institute and The British Library, 2010). Postgraduate education and training offers learners the opportunity to be exposed to courses that are advanced and tied to the development needs of societies. The ultimate purpose of postgraduate education and training is, therefore, to increase the capacity of individuals to create new knowledge for social, scientific and civic progress (Morgan, Melissa & Finkelstein, 2016; Connor & Shaw, 2008). These individuals adapt and generate knowledge, promote international cooperation and improve competitiveness in the global knowledge based economy (African Union, 2006; World Bank 2002; Eggins, 2008; Commission for Africa, 2004; World Bank, 2002). The other vital role of postgraduate education and training concerns its economic outcomes and impacts. It facilitates employment, promotes savings, creates greater tax revenues and improves the state of work (Pillay, 2011; Yizengaw, 2008).

Ghana’s postgraduate education and training system, like many developing countries, is unable to deliver these benefits. This is due mainly to a myriad of challenges that include a) weak institutional capacity (including limited funding), b) low level of collaboration for re-

Paper presented at the National Summit on Tertiary Education: November 2 – 4, 2016
search and development, c) non-existent publication and commercialisation policy and d) problematic retirement policy. At the heart of these challenges lies the problem of inadequate funding especially for research purposes (Newman & Duwiejua, 2015; The Africa-America Institute, 2015; Morgan, Melissa & Finkelstein, 2016). The consequence of these challenges is the limited impact of postgraduate education and training on Ghana’s social, economic, spatial and institutional development.

To address the fore-stated challenges, postgraduate education and training in Ghana needs to be evaluated and re-oriented to respond to the rapid changes in the global environment. The aim of this paper, therefore, is to initiate a policy-oriented discourse on the future of postgraduate education and training in Ghana and identify strategies that can be implemented to make it more resilient and competitive in an increasingly globalising and competitive world. The specific objectives are to:

- Determine the role of postgraduate education and training in national development
- Assess the status, rationale, orientation and structure of postgraduate education and training in Ghana in relation to global trends and best practices
- Assess collaboration between postgraduate education and training and industry in terms of market demands, employment prospects and funding support
- Analyse the strengths, weaknesses, opportunities and threats (SWOT) of postgraduate education and training in Ghana in order to derive proposals to increase its output, relevance and productivity
- Make recommendations for a national vision and policy to drive postgraduate education and training into the next 20-40 years and strategies for implementation.

2. Approach and Method
The data used in this paper were obtained through a review of secondary data from published scholarly works, reports and government documents. These were complemented with views from some of the Vice-Chancellors and past Vice-Chancellors, Deans of the school of graduate studies and Professors (who have experiences in postgraduate education and training) in the public universities in Ghana. Their views were elicited through interviews that were conducted with the aid of interview guides (annex 1).

The interviews were organised to facilitate the collection of data on the following themes:

- challenges of postgraduate education and training in Ghana
- aspirations and relevant outcomes of postgraduate education and training in Ghana
- strengths, weaknesses, opportunities and threats of postgraduate education and training in Ghana
- strategies for building a resilient and sustainable postgraduate educational system in Ghana.

The data were then synthesised with lessons that were drawn from the review of postgraduate education and training experiences in some countries in Africa and Europe and some universities in the United States of America (USA). The performance of these universities was determined based on the world university ranking developed by Times Higher Education (THE). The assumption was that highly ranked universities offer lessons that could be useful for postgraduate educational policy formulation and implementation in Ghana.

__Paper presented at the National Summit on Tertiary Education: November 2 – 4, 2016__  
3. **Role of Postgraduate Education and Training in National Development**

Evidence from the world over shows that postgraduate education and training makes significant contribution to the sustainable development of countries. For instance, Pillay (2011) reports that the government of South Africa earns ZAR 1.90 for every ZAR 1.0 invested in postgraduate education and training. He further reports that the South African economy expands by up to ZAR 11.0 for every extra ZAR 1.0 spent on postgraduate education and training. The Africa-America Institute (2015) also reports that investment in higher (including postgraduate) education and training in Africa yield returns of approximately 21%, which is the highest in the world. The foregoing implies that postgraduate education and training is more than the next level in the learning process. It is known to develop leadership in postgraduate trainees, to prepare them for their future positions in the various sectors of national and local economies (van der Aa *et al.*, 2016).

The impacts are sustainable as long as postgraduate education and training continues to respond to rapid changes in technology (Yizengaw, 2008; Tilak, 2003; Azcona *et al.*, 2008), and this can be achieved through continuous research and development. Through research, the needs of society are understood and strategies and approaches required to respond to these societal needs identified. It is for this reason that one in five research students in the United Kingdom benefits from a waiver of tuition fees (Higher Education Policy Institute and The British Library, 2010). McDevitt *et al.*, (2014) add that through postgraduate research, 153 drugs have been produced and approved in the United States of America for the treatment of Vitamin D deficiencies, epileptic seizures, cancer and HIV. Licensing and patenting the ideas and innovations that result from postgraduate research and training programmes added $187 billion to the country’s gross domestic product (GDP), $457 billion to the gross industrial output and created 279,000 jobs between 1997 and 2007 in the United States of America (Association of University Technology Managers, 2015; Pradhan, 2010). The overall implication is that without postgraduate education and training, the development of societies would be slow.

4. **Review of Ghana’s Postgraduate Education and Training System**

This section of the paper covers an assessment of postgraduate education and training in terms of its rationale, status, orientation and ability to deliver some of the benefits discussed in section 3 of this paper.

4.1 **Rationale and Status**

Universities and other institutions of higher learning in Ghana were established to help meet the manpower needs of the country’s productive sectors as well as undertake relevant research to promote and sustain its development. Postgraduate education and training offered by these universities and institutions of higher learning was expected to accelerate the achievement of sustainable development of the country. The benefits, as discussed in section 2 of this paper, provide the justification for postgraduate education and training in Ghana.

The postgraduate education and training programmes in Ghana are organised by tertiary institutions and their affiliate institutions. It covers a wide range of provisions, from taught programmes and postgraduate certificates and professional programmes to research programmes. The duration of study depends on the type of programme. Regular master programmes last up to 24 months while those that are part-time span up to 36 months. These can be extended by 12 months. Regular PhD programmes last for up to 48 months and those that are part-time,
60 months. These programmes can also be extended by 24 months. Many of the institutions offer postgraduate diploma programmes that span between 1 and 6 months. This structure of postgraduate education and training in Ghana is similar to that of many countries in the world.

4.2 Orientation of Postgraduate Education and Training

The postgraduate educational programmes are oriented to cover a wide range of subject areas. Degrees offered upon successful completion of the programmes include: Master of Arts (MA), Master of Science (MSc), Master of Technology (MTech), Master in Law (LLM), Master of Business Administration (MBA), Master of Public Administration (MPA), Master of Public Health (MPH), Master of Education (M.Ed), Master of Philosophy (MPhil), Doctor of Philosophy (PhD), and Postgraduate Diploma (Postdip). These programmes are categorised into two, namely, postgraduate taught programmes and postgraduate research programmes. The former are delivered and assessed through a series of seminars, lectures and tutorials following a structured timetable. They may include a term paper or an independent research in an area of interest. Graduates often work in non-research based organisations.

The latter, on the other hand, is more of an independent approach with no compulsion of attending lectures. Students under this category are often assessed entirely by their research work. The students often work in research-based organisations such as universities and their affiliate institutions. In recent times, however, it is common to find graduates taking up employments in areas that are unrelated to their academic training (Morgan, Melissa & Finkelstein, 2016). This partly stems from the increasing number of students who enrol in postgraduate programmes in Ghana (Figures 1 and 2). The other reason is the failure of the universities and the affiliate institutions to review the curricula for postgraduate education and training to harmonise emerging issues in society.
The increasing trend of student population in Ghanaian universities is similar to trends in several parts of the world (Figure 3).
Figure 3. Forecasted Tertiary Enrolments

Source: Education Intelligence (2014)

As of 2008, there was a steady increase in the number of doctorate degrees that were awarded in several countries in the world. The highest numbers of doctorates awarded in a selected number of countries are as follows: United States of America (42,000), Germany (23,000) United Kingdom (15,000) and India (13,000).

4.3 Governance of Postgraduate Education and Training

The institutions that offer postgraduate programmes in Ghana are supervised by the National Council for Tertiary Education (NCTE) and the National Accreditation Board (NAB). These two institutions (NCTE and NAB) are under the oversight of the Ministry of Education. The National Council for Tertiary Education is established by Act 454 which mandates the Council to provide advisory services to the Minister of Education on matters (such as standards, financial needs, national standards and norms, and measures for the generation of additional funds) that affect tertiary education in Ghana.

The National Accreditation Board is also established by Act 744, which mandates the Board to accredit universities that meet the requisite standards of the Tertiary Educational System. Each of these regulatory bodies plays roles towards the development and sustenance of postgraduate education and training in Ghana.

The status and orientation of postgraduate education and training in Ghana is not unique because it is consistent with those in other countries (both developed and developing) in the world. Despite this, postgraduate education and training has not yielded significant benefits.
to the development of Ghana. An attempt has been made to identify the factors that have culminated into this in the next section of the paper.

5. Challenges of Postgraduate Education and Training in Ghana
In this section of the paper, the factors that have undermined the effectiveness of postgraduate education and training in Ghana are discussed.

5.1 Limited Funding
As presented in Table 1, funds for postgraduate education and training come from a variety of sources although the dominant source is the Government of Ghana. Seventy percent of the funds of the universities come from the central government in fulfilment of its constitutional duty (Article 38(1) of the 1992 Constitution of Ghana)\(^1\). The government sources cover grants that are channelled through the National Council for Tertiary Education and the Ghana Education Trust Fund (GETFund). The remaining 30% is mobilised by the universities themselves from sources such as student tuition payments and research grants from development partners.

Government’s expenditure on education has increased by approximately nine folds from GH₵407 million in 2003 to 3,789 million in 2013. Educational expenditure as a percentage of gross domestic product increased from 6.2% in 2003 to 10.1% in 2008 but declined to an average of 4.2% from 2009 to 2013 (Ghana Statistical Service, 2014). Newman & Duwiejua, (2014) report that 19% of the funds allocated to education are spent on tertiary (including postgraduate) education. The proportion of the allocations for postgraduate education and training is however not clearly known.

Central Government’s funding of tertiary (including postgraduate) education and training is not unique to Ghana. Table 1 shows that the share of university revenue from the public is higher than the proportion from other sources.

Table 1: Funding Higher Education in Some Selected Countries in Africa

<table>
<thead>
<tr>
<th>Country</th>
<th>Source</th>
<th>Reference(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Government (%)</td>
<td>Internal (%)</td>
</tr>
<tr>
<td>Egypt</td>
<td>85-90</td>
<td>10-15</td>
</tr>
<tr>
<td>Ghana</td>
<td>70</td>
<td>30</td>
</tr>
<tr>
<td>Mauritius</td>
<td>78</td>
<td>22</td>
</tr>
<tr>
<td>Nigeria</td>
<td>90</td>
<td>10</td>
</tr>
<tr>
<td>South Africa</td>
<td>*60 or 30</td>
<td>*35 or 70</td>
</tr>
<tr>
<td>Tanzania</td>
<td>82</td>
<td>18</td>
</tr>
<tr>
<td>Uganda</td>
<td>72</td>
<td>28</td>
</tr>
</tbody>
</table>

\(^1\) State shall provide educational facilities at all levels and in all the regions of Ghana, and shall, to the greatest extent feasible, make those facilities available to all citizens.

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* Varies. Depends on the ability of the university to generate internal revenue.

The actual figures for Ghana may be lower judging from the funding gap shown in Figure 4. Newman and Duwiejua (2015) report that the funding gap has averaged 44% between 2011 and 2015. The funding gaps appear to be widespread in sub-Saharan Africa. World Bank (2008) had earlier observed that the expenditure per student in sub-Saharan African countries had declined from US$6,800 in 1980 to US$981 in 2005. This could have had adverse ramifications on postgraduate education and training evident in the poor research visibility of the universities in the region. None of the universities was ranked among the best 100 universities in the world (Figure 5). The best performing university, University of Cape Town, was 120th in the world (Times Higher Education World University Ranking 2015-2016).

![Figure 4: Funding Gaps in Ghanaian Universities](image)

Source: Newman and Duwiejua (2015)

The funding difficulties in postgraduate education and training in Ghana were compounded by the reduction of public funding to personal emoluments in the 1990s (Girdwood, 1999). This phenomenon is widespread in sub-Sahara Africa (Morgan et al., 2016). Currently, many of the universities depend on the funds their staff attract from external sources through research and consultancies. The government’s book and research allowances paid to the academic staff of these public universities are inadequate. As a result, the relevance of postgraduate education and training is hardly felt in Ghana. Students’ research projects hardly result in any innovations that can advance the course of society. Graduates from taught programmes hardly understand the job environment before graduating. Ultimately, these graduates need retraining before they are able to meet the demands of the work environment. In order to alleviate the problem of limited funding for research, some of the universities (KNUST and University of Ghana) have established offices for grants and research where funds, although very limited, are made available to researchers to carry out research projects. The coverage of the grants is however very low. These offices also link staff to various funding sources.

The results of the limited financial standing of the university in respect of postgraduate education and training are the following: a) limited infrastructure (library, workshops and laboratories) amidst increasing population of postgraduate students and trainees, b) low staff strength and motivation, and c) poor visibility of Ghanaian universities in the world.

_Paper presented at the National Summit on Tertiary Education: November 2 – 4, 2016_  
5.2. Weak Collaboration
The institutions of higher learning in Ghana seldom collaborate with other institutions in the public and private sector in running their postgraduate educational and training programmes. Collaboration could have taken the forms of research partnership, research services, shared infrastructure, human resource training and transfer, commercialisation of intellectual property and scientific publications. These have the prospects of mitigating the burden of supervision on the academic staff posed by the increasing student population as well as the need for the academic staff to undertake research for progression. Such collaborations could also have made the research activities of the universities targeted more at societal problems.

5.3 Weak Publication Policy
Abaidoo (2014), using KNUST as a case study, identified staff-publication ratio of 1.78, which ranged from 0.94 in the College of Engineering to 2.46 in the College of Agriculture and Natural Resources. The University of Ghana had a total of 3,829 publications to its credit by the year 2017. Approximately 42% and 47% of the total number of publications were recorded between the years 2000 – 2009 and 2010-2017, respectively. This implies that the interest in publications is rising although the number and impacts of these publications are low with reference to the University Ranking by Academic Performance introduced by the ACI Information Group. The ranking covers 2,000 universities and colleges in the world and ranks these universities and colleges in terms of their scholarly research based on: a) number of articles published in a given year, b) research impact in terms of citation, c) sustainability and continuity of scientific productivity, d) article impact total, e) citation impact total, and f) international collaboration. None of the universities in Ghana made it to the ACI list, which implies low research productivity and impact. This has been occasioned by the weak publication policies in the universities.

Researchers are required to publish research works within an environment of limited funds for research and coupled with the increasing number of undergraduate students. Renewal of contract of academic staff of the universities are not based on performance, which could have been measured in terms of the number of publications and number of grants awarded among other indicators.

5.4. Supervision and Ethic Policies
At the heart of postgraduate education and training is the quality of academic research supervision. This is a key strategy to influencing time-to-degree and throughput rates at institutions of higher learning (Holtman and Mukwada, 2014). In this regard, it is expected that universities in Ghana would have policies to ensure quality research supervision. Many of the universities, until recently, did not have a university-wide policy to regulate teaching and supervision of postgraduate education. For instance, KNUST approved a university-wide policy for supervision in 2017. The lack of a university-wide supervision policy partly explains why almost 70% of a sample of 51 PhD students and 39% of a sample of master students had overstay their programmes. Another key reason for this is that full-time postgraduate students combine work with education. The affected students are therefore unable to cope with the demands of full-time postgraduate education and thus overstay their programmes. The supervision policy defines the roles and responsibilities of all the stakeholders, including the School of Graduate Studies, in supervision of postgraduate research. Supervisors are required to direct their students to possible sources of funds for research and dissemination.

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The supervision policy is closely tied up to ethics policy. The ethical implications of research for research subjects, researchers and research sponsors is an intrinsic part of quality research practice. As a result, an attempt has been made by all the universities in Ghana to establish some set of fundamental principles. The idea is to ensure good scientific practice, the integrity of research involving human participants and the general principles of data confidentiality and access. In addition to this, university research ethics committees have been set up in the various higher learning institutions to man this sort of research governance. The ethics committees are hardly well resourced to clamp down on all the associated acts that constitute a breach of the ethical standards. A classical example is their inability to determine researchers who fail to obtain the appropriate permission to conduct research; unauthorised use of information which was acquired confidentially; fabrication, falsification or corruption of research data and dishonest misinterpretation of results among others. All these form part of the challenges of postgraduate education and training in Ghana.

5.5. Problematic Retirement Age
The statutory compulsory retirement age of 60 for public servants in Ghana hampers postgraduate education and training in Ghana. This age is the prime age where academic staff can bring their wealth of experience to bear on postgraduate education and training. At this age academic staff are able to attract grants to enrich postgraduate education and training. Many of the universities and their affiliate institutions that offer postgraduate educational programmes lack effective mentorship policy to train the young and new academic staff.

To address the problems associated with the retirement of experienced academic staff, some of the public universities have policies to contract the experienced professors and research staff after retirement. The offer is however limited, which implies that a good number of the experienced academic staff are allowed to retire.

5.6. Lack of Doctoral Academies
The institutions that offer postgraduate educational programmes have made very little efforts to establish doctoral academies where postgraduate students and their supervisors could meet annually to exchange ideas. Students and their supervisors are also unable to take advantage of doctoral academies that have been established in other universities in Africa and the rest of the world due mainly to financial limitations.

6. Ingredients for a 40-Year Policy for Postgraduate Education and Training in Ghana
In this section of the paper, a vision is proposed to guide postgraduate education and training in Ghana. Three outcomes should be realised in order to achieve the long term vision. The strengths, weaknesses, opportunities and threats (SWOT) of the universities in achieving the proposed outcomes are analysed. Proposals are also made to address the barriers of postgraduate education and training in Ghana as discussed in section 4 of this paper.

6.1. Proposed Vision for Postgraduate Education and Training in Ghana
For sustainable development of Ghana, the universities and the affiliate institutions that run postgraduate educational programmes should aim to “become leaders in postgraduate education for holistic capacity building to drive the course of sustainable development”.

Paper presented at the National Summit on Tertiary Education: November 2 – 4, 2016
6.2. Proposed Outcomes for Postgraduate Education and Training and their Strengths, Weaknesses, Opportunities and Threats (SWOT)

In the pursuit of the vision outlined in section 6.1 of this paper, the outcome of postgraduate education and training in Ghana should be increased knowledge of students and trainees for accelerated social, scientific and civic progress. At the heart of this lies the need for postgraduate institutions to be developed into centres of excellence for the enhancement of students and trainees’ professional skills. Any successful postgraduate student or trainee is expected to be capable of driving the process that leads to societal advancement. In this regard, research-based postgraduate programmes are required to imbue in students and trainees the art of undertaking problem-based and scientific research projects that result in the development of new and innovative ideas for the advancement of society. These students and trainees should also be critical independent thinkers with adequate working knowledge of the scientific method.

Course-based (taught) postgraduate programmes, on the other hand, should imbibe in students and trainees professional skills to improve their marketability and employability. This underscores the critical importance of internship programmes for such postgraduate students and trainees. The outcomes of postgraduate education and training are categorised into three and summarised in Table 2.

Table 2: Outcomes of Postgraduate Education and Training in Ghana

<table>
<thead>
<tr>
<th>Category</th>
<th>Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply-side (institutions offering postgraduate programmes)</td>
<td>Institutions of excellence for the education and training of postgraduate students and trainees to drive the wheels of development established.</td>
</tr>
<tr>
<td>Demand-side</td>
<td>Graduates who can adapt to the workplace culture and trained to use their abilities and skills to improve organisation employed.</td>
</tr>
<tr>
<td></td>
<td>Graduates who are capable of thinking critically to innovate and anticipate as well as lead change produced.</td>
</tr>
<tr>
<td>Trainees / students</td>
<td>Students acquire professional skills to improve their marketability and employability after successfully undergoing the education and training.</td>
</tr>
</tbody>
</table>

The purpose of the SWOT analysis is to assess the internal strengths and weaknesses of postgraduate educational institutions in Ghana, their opportunities, and the threats presented by external factors in their quest to achieve the desired outcomes presented in Table 3. The analysis is based on the outcomes of postgraduate education and training from the three perspectives.

a) Establishing Institutions of Excellence for Postgraduate Education and Training

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The SWOT for the establishment of the universities and their affiliates as institutions of excellence are presented in Table 3. The strengths for this outcome include: a) highly trained and committed academic and administrative staff in the universities and their affiliate institutions, b) their good reputation, c) payment of tuition fees by students and trainees, d) autonomy of the institutions to raise revenue from income generating activities, and e) availability of basic infrastructure for training and research. The weaknesses against the establishment of the centres of excellence include: a) low staff motivation, b) increasing student population leading to pressure on academic and administrative staff, c) old and dilapidating teaching and learning infrastructure, d) low integration of research into teaching, and e) weak financial capacity.

The following opportunities could complement the strengths to resolve the weaknesses: a) state funding for postgraduate education and training to complement internally generated revenue, b) funding from development partners to complement public funds and internally generated revenue to mitigate the infrastructural difficulties, c) open university system to help students and trainees to access relevant literature and experts, d) willingness of industry to accept interns for training, and e) expanding higher educational jobs and the Ghanaian economy. Creating institutions of excellence are however threatened by: a) unreliable external funding sources and b) retiring professors at their prime productivity levels.
Table 3: SWOT Analysis for Centre of Excellence

<table>
<thead>
<tr>
<th>Strengths</th>
<th>Weaknesses</th>
<th>Opportunities</th>
<th>Threats</th>
</tr>
</thead>
<tbody>
<tr>
<td>□ Highly trained and committed academic and administrative staff</td>
<td>□ Low staff motivation</td>
<td>□ State funding for postgraduate education and training</td>
<td>□ Unreliability of external funding</td>
</tr>
<tr>
<td>□ Good reputation of the universities</td>
<td>□ Increasing student population</td>
<td>□ Funding from development partners</td>
<td>□ Competition among the universities for limited public funds</td>
</tr>
<tr>
<td>□ Students and trainees’ payment of tuition fees</td>
<td>□ Old and deteriorating teaching and learning infrastructure</td>
<td>□ Open university system</td>
<td>□ Retiring professors</td>
</tr>
<tr>
<td>□ Autonomy of the institutions to raise revenue from income generating activities</td>
<td>□ Low integration of research into teaching, weak financial capacity</td>
<td>□ Willingness of industry to accept interns for training</td>
<td></td>
</tr>
<tr>
<td>□ Availability of basic infrastructure for training and research</td>
<td></td>
<td>□ Expanding higher educational jobs and the Ghanaian economy</td>
<td></td>
</tr>
</tbody>
</table>

The following strategies have been proposed to enable the universities and their affiliates to use the strengths to address the weakness and the opportunities to mitigate the threats:

□ Increasing enrolment for foreign and Ghanaian fee-paying students to increase their revenue base in order to reduce their overdependence on public funding and mitigate the threats posed by unreliable external funding.

□ Ensuring regular on-the-job training for academic and administrative staff of the institutions that offer postgraduate educational programmes

□ Taking advantage of the highly trained and motivated staff to collaborate with external stakeholders to attract funding and ideas to enrich postgraduate programmes.

□ Creating opportunities for exchange programmes for staff and students in order to address the threats posed by dilapidating infrastructure.

□ Using the autonomy of the universities to mobilise revenue from commercial ventures and alumni endowment funds to complement public funding in order to mitigate the risks posed by the unreliability of donor funding. This is a strategy that can help the universities to retain the experienced professors who have to leave upon retirement as well as maintain the dilapidating infrastructure.
b) Producing Critically-Thinking Graduates to Innovate, Anticipate and Lead Change

In a competitive global economy, employers seek graduates who are trained to think critically and engineer change to employ. Postgraduate education and training programmes offered in Ghana for the next 20-40 years should be capable of meeting this demand.

The following are the advantages that exist in the universities in Ghana and their affiliate institutions to meeting this demand: a) availability of competent staff to impart to students the required skills, b) availability of workshops and laboratories in the universities and their affiliate institutions to adequately train the students and trainees, and c) availability of business incubators. The weaknesses however include: a) over-concentration of the universities on non-science and technical programmes, b) limited number of staff and c) inadequate facilities to adequately train the postgraduate students and trainees. The opportunities to help address the weaknesses and mitigate the threats include but not limited to: a) willingness of the private sector to complement the efforts of the universities through internships and attachments, b) support from donor agencies in terms of funds and infrastructure and c) support from alumni for the creation of endowment fund to support postgraduate education and training. The SWOT for the production of critical thinkers capable of anticipating and leading change has been presented in Table 4.

Table 4: SWOT Analysis for the Production of Critical Thinkers Capable of Anticipating and Leading Change

<table>
<thead>
<tr>
<th>Strengths</th>
<th>Weaknesses</th>
<th>Opportunities</th>
<th>Threats</th>
</tr>
</thead>
<tbody>
<tr>
<td>□ Competent multidisciplinary professionals and teams in the universities</td>
<td>□ Skewness of higher education to Arts and Humanities and less relevant curricula</td>
<td>□ Willingness of the private sector to participate in education</td>
<td>□ Limited collaboration between the universities and local industry</td>
</tr>
<tr>
<td>□ Availability of workshops and laboratories to give students practical experiences</td>
<td>□ Limited number of staff amid increasing enrolment</td>
<td>□ Internship opportunities from the private sector</td>
<td>□ Increasing cost of education</td>
</tr>
<tr>
<td>□ Availability of incubators and business development centres in the universities</td>
<td>□ Inadequate academic facilities</td>
<td>□ Support from donor agencies in terms of funds and infrastructure</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>□ Support from alumni for the creation of endowment fund</td>
<td></td>
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</table>

The strategies in this section of the paper are proposed for the universities and their affiliates to use the strengths to address the weakness and the opportunities to mitigate the threats against the production of critical thinkers:

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Using the highly competent staff to revise the university curricula to adequately respond to demands from the industry

Teaming up with the industry to provide university students the platform to learn while in school

Establishing research and innovative centres as well as research funds to provide funding for research activities

Support students and trainees to present their works in conferences and workshops

c) Marketability and Employability of Postgraduate Students

Table 5 outlines the SWOT for meeting the desire of postgraduate students and trainees to be marketable and employable upon completion of their studies or training. The strengths the institutions have include: a) availability of varied courses taught by highly trained professionals and b) availability of facilities such as laboratories, workshops and business incubators to train students to be marketable. The internal barriers include: a) limited expansion of academic infrastructure amid increasing student population, b) limited collaboration with the industry to offer all students hands-on training, and c) curricula overly focussed on theory and their failure to match the advances in the world of work.

The following opportunities could complement the strengths to resolve the weaknesses and mitigate the threats: a) expanding Ghanaian economy leading to increasing demand for graduates, b) opportunities, although limited, created by industry and professional associations as well as civil society groups for postgraduate students and trainees to have internships and attachments, and c) presence of professional bodies to collaborate with the academia to offer trainees hands-on training. The threat against the outcome indicators (which is training of marketable and employable graduates) is Ghana’s overreliance on imports which could hamper the use of the ideas of the students for productive purposes.

Table 5: SWOT Analysis for the Enhancement of the Marketability and Employability to Postgraduate Students and Trainees

<table>
<thead>
<tr>
<th>Strengths</th>
<th>Weaknesses</th>
<th>Opportunities</th>
<th>Threats</th>
</tr>
</thead>
<tbody>
<tr>
<td>Availability of a wide variety of relevant courses on offer by institutions</td>
<td>Limited expansion of academic infrastructure amid increasing student population</td>
<td>Expanding economy leading to increasing demand for graduates</td>
<td>Ghana’s overdependence on imports</td>
</tr>
<tr>
<td>Highly trained academic and non-academic staff teaching these courses</td>
<td>Limited collaboration with the industry</td>
<td>Opportunities for internships and attachments</td>
<td></td>
</tr>
<tr>
<td>Availability of facilities (laboratories, workshops and business incubators)</td>
<td>Curricula overly focussed on theory</td>
<td>Presence of professional bodies to collaborate with the academia</td>
<td></td>
</tr>
</tbody>
</table>

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The following strategies are proposed for the enhancement of the employability and marketability of postgraduate students and trainees:

- Update curricula of various programmes to be consistent with changes in the industry
- Universities and their affiliates should collaborate with the industry and professional associations to offer the platform for the students to acquire hands-on training.

6.3. Proposals to Overcome the Barriers of Postgraduate Education and Training in Ghana

The proposals open with a funding model for postgraduate education and training. This model draws from the experiences of countries with the best forming universities (based on The Higher Education [THE] ranking). The proposals also cover accreditation, auditing, professional and academic programmes, ethics and research policy, doctoral academy, and criteria for promotion.

6.3.1 Funding Model for Postgraduate Education and Training

a) Restructuring Public Fund Allocation

The incremental budgeting approach operational in Ghana should be reviewed and in its stead should be block grants and earmarked grants. Beneficiary institutions should prepare their rolling budgets that should be integrated into government’s Medium Term Expenditure Framework (MTEF) budget. This proposal will enable the institutions that offer postgraduate education and training programmes an opportunity to plan to cover the medium term. The block funds should be allocated to an institution based on its: a) research outputs in terms of publication units, and the number of graduates from research master and doctoral programmes, b) research visibility and c) graduation rates.

There should be an institutional factor grant to be given to every institution irrespective of student size. The earmarked funds should be used for: a) research development, b) teaching programmes, c) approved capital projects and d) teaching development.

The following strategies are proposed for the effective utilisation of the research components of the block and earmarked grants allocated for postgraduate training and research in Ghana:

- establishing a centralised research fund under the supervision of the National Council for Tertiary Education, b) decentralising the operations of the central research fund to each institution of higher learning to approve grant proposals, c) approving research proposals based on the development focus of the country and the departments running the postgraduate programmes, and d) monitoring the use of the grants and evaluating their impacts for continuous reforms.

b) Cost-sharing through Tuition and Other Income Generating Activities

The following strategies are proposed to increase the share of tuition fees in the total institutional revenue:

- Introduction of professional programmes.
- Increasing the number of foreign students into their postgraduate programmes. These foreign students pay the full cost of education and training and could therefore be significant sources of funds for postgraduate research. Newman and Duwiejua (2015) had earlier made a case for relevant institutions to increase postgraduate enrolment to between 10 and 25% of student population. They further proposed a ratio of 1 PhD student to 5 master students.
Introduce online programmes and programmes on virtual platforms.
Run tailor-made courses and workshops for the public and private institutions to raise revenue for postgraduate education and training.
Consult for private and public institutions for revenue under strict institutional guidelines and supervision.
Training academic staff of the universities in research proposal development and grant management to attract funding from development partners for postgraduate education and research.
Using the institutions’ laboratories by researches and practitioners in the industry for research (e.g. testing microbial and chemical of manufactured goods).

6.3.2 Strengthening Collaboration
Collaboration can help in the mobilisation of funds and human resources to run postgraduate educational programme. A study in Chile and Colombia revealed that collaboration with universities offering postgraduate studies increased substantially the propensity of firms to introduce new products and to patent (Marotta et al., 2007). The legislation that protects intellectual property can stimulate the implementation of this proposal. The implication is that postgraduate education and training should be restructured to breed innovation. The possible areas of collaboration are presented in Table 6.

Table 6: Means of Collaboration

<table>
<thead>
<tr>
<th>Area of collaboration</th>
<th>Types of Collaboration</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>Relationships</td>
<td>Research partnership</td>
<td>Inter-organisational arrangements for pursuing collaborative research and development, including research consortia and joint projects.</td>
</tr>
<tr>
<td></td>
<td>Research services</td>
<td>Research-related activities commissioned to universities by industrial clients, including contract research, consulting, quality control, testing, certification, and prototype development.</td>
</tr>
<tr>
<td></td>
<td>Shared infrastructure</td>
<td>Use of university laboratories and equipment by firms, business incubators, and technology parks located within universities.</td>
</tr>
<tr>
<td>Mobility</td>
<td>Academic entrepreneurship</td>
<td>Development and commercial exploitation of technologies pursued by academic inventors through a company they (partly) own (spin-off companies).</td>
</tr>
<tr>
<td></td>
<td>Human resource training and transfer</td>
<td>Training of industry employees, internship programs, postgraduate training in industry, and secondments to industry of university faculty and research staff, adjunct faculty of industry participants.</td>
</tr>
<tr>
<td>Area of collaboration</td>
<td>Types of Collaboration</td>
<td>Remark</td>
</tr>
<tr>
<td>-----------------------</td>
<td>------------------------</td>
<td>--------</td>
</tr>
<tr>
<td>Transfer</td>
<td>Commercialisation of intellectual property</td>
<td>Transfer of university-generated IP (such as patents) to firms (e.g., via licensing).</td>
</tr>
<tr>
<td></td>
<td>Scientific publications</td>
<td>Use of codified scientific knowledge within industry.</td>
</tr>
<tr>
<td></td>
<td>Informal interaction</td>
<td>Formation of social relationships (e.g., conferences, meetings, social networks).</td>
</tr>
</tbody>
</table>

Source: Adapted from Perkmann and Walsh 2007

6.3.3 Institutional Capacity Building
The increasing student population and the need for the tertiary institutions to collaborate with other stakeholder imply that faculty would be overburdened. The following strategies can help resolve this:

- Investing in facility expansion to correspond with increasing enrolment.
- Employing additional academic and administrative staff to commensurate with the rate of increment in enrolments.
- Introducing on-the-job training for staff to enhance effectiveness and efficiency. These include short participation in short courses, opportunities for further studies, and conference and workshop attendance.
- Implementing performance-based contracts to ensure efficiency.
- Providing opportunities to faculty members to undertake exchange programmes in other universities.
- Exchange and internship programmes for postgraduate programmes.
- Inviting experts and professionals to teach courses designed to build soft skills required for the efficient delivery of the graduate research process.

The following strategies are proposed to contribute to sustaining the collaboration between postgraduate education and training with industry:

- Focussing on areas Ghana has comparative advantage in to develop a competitive niche for local industry.
- Providing tax incentives to companies that are engaged in direct manufacturing to make them competitive.
- Government contract to these industries to keep them competitive.

6.3.3 Regular Monitoring of Postgraduate Education and Training
The possible risk of the funding strategies outlined in this paper is a deviation of the universities and their affiliate institutions from their core mandate. Standards could also be compromised. The following strategies are proposed:

- Ensuring that each postgraduate programme offered by the universities and their affiliate institutions is accredited. The programmes must be assessed before accreditation could be renewed.
- Monitoring the universities and the affiliate institutions to ensure the continued relevance of the postgraduate educational programmes. Programmes should be regularly reviewed to respond to the demands of industry.
- Instituting and strengthening quality assurance systems.

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6.3.4 Ethics and Research Policy to ensure Integrity

Attention to the ethical implications of research for research subjects, researchers and research sponsors is an intrinsic part of good research practice. In this regard, all the universities and their affiliate institutions that offer postgraduate educational and professional programmes should establish Research Ethics Committee to guide research. The idea is to ensure compliance with good scientific practice, protect the integrity of research involving human participants and comply with the general principles of data confidentiality and access. These Research Ethics Committees should be resourced (financially, logistically and human resource) to enable them ensure that researchers obtain the appropriate permission to conduct research. These committees would also prevent the unauthorised use of information fabrication, falsification or corruption of research data, and dishonest misinterpretation of results.

6.3.5 Supervision Policy

Supervision of postgraduate education should be the responsibility of all stakeholders including students, supervisor, relevant departments, Schools of Graduate Studies and NCTE. The supervisor of a postgraduate student is required to provide academic guidance and practical support from the inception of the project to its completion. For the purposes of quality assurance, an academic supervisor should have, at least, an equivalent qualification. Supervisors can learn through a combination of the following: a) from more experienced ones, b) by participating in workshops and c) by attending courses on supervision. As with the graduate students, the supervisors have to continuously monitor the supervision process and their own capabilities.

The School of Graduate Studies of the various postgraduate institutions should monitor research supervision at the various departments. Students should be required to assess themselves and the supervision process by completing a reporting template and submitting to the School of Graduate Studies. Supervisors should also report on the progress of their students and submit their report through the Head of Department to the School of Graduate Studies. By following this procedure, problems with supervision would be detected early and resolved to forestall delays in completing postgraduate programmes.

The afore-stated supervision proposals have implications for the introduction of supervision guidelines that clearly spell out the roles of each stakeholder. The relevant universities should also organise regular capacity enhancement programmes for supervisors to facilitate the process. Mentorship schemes where young academic could partner with and learn supervision skills from experienced ones should be encouraged. This is possible through the adoption of the “committee supervision system”. This could partly mitigate the effects of the problematic retirement age, which has been discussed in section 5 of this paper.

6.3.6 Review of the Criteria for Promotion and Retirement Age

The retirement age of distinguished academics should be extended to 70 years subject to good health. This has implications for criteria for promotion. The criteria should be made robust enough to ensure that distinguished academics are recognised in all parts of the world as distinguished academics. Attraction of grants for research could be made an important element in the criteria for promotion. Such distinguished academic staff can continue to attract grants for research purposes even after attaining the compulsory age of 60 years. In this regard, the benefits the tertiary institutions would derive from the retention of the distinguished academ-

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ic staff beyond the compulsory retirement age would outweigh the cost. Such staff can con-
tinue to lead supervisory teams and not only supervise graduate students but also mentor
young academics.

6.3.7. Establishment of Doctoral Academies
The public universities and their affiliate should establish doctoral academy to help doctoral
students, supervisors and researchers in general to discuss research ideas and develop these
ideas to research projects. The doctoral academies could also offer participants the opportuni-
ties to network to undertake scientific and ground-breaking research.

7. Implementation Arrangements
The implementation of the proposals in section 6 of this paper require concerted efforts of the
individual institutions that run postgraduate programmes, NCTE and the National Accredita-
tion Board. The universities and their affiliate institutions should enhance their collaboration
with other stakeholders (government, private sector, development partners and other public
and private tertiary institutions) towards the enhancement of their capacities. These institu-
tions should also play the lead role in introducing policies on research ethics and research su-
ervision as well as introduce innovative strategies to increasing internally generated reve-
 nue.

NTCE should focus on quality assurance through regular monitoring and evaluation of the
operations of the tertiary institutions. It should also facilitate the restructuring of funding for
public universities based on the proposal made in this paper. The NAB should ensure that all
postgraduate programmes run by the tertiary institutions are accredited. This will ensure that
these programmes are revised regularly to meet the ever changing demands of the industry.

8. Conclusion
The purpose of the paper was to identify strategies that can be implemented to make post-
graduate education and training resilient and competitive in an increasingly globalising and
competitive world. Literature on international best practices show that highly ranked and in-
ternationally recognised universities adopt diverse models to mobilise funds and ensure com-
pliance with standard practices in research. These universities also collaborate with other
stakeholders to enhance their capacities and visibility.

The paper concludes that postgraduate education and training programmes in Ghana can be
made more relevant to national development in the next 20-40 years if these programmes
help to build the tertiary institutions as centres of excellence for the production of critically-
thinking graduates who are capable of innovating, anticipating and leading change. This is
c contingent upon restructured public funding with dedicated funds for research, compliance
with research ethics and collaboration with other stakeholders in the running of postgraduate
education. Quality assurance needs enhancement to ensure that the postgraduate programmes
continue to meet standards and are relevant to changing societal needs.

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Future of Postgraduate Education in Ghana

Interview Guide

Introduction:
The purpose of this interview is to learn from the views of experienced academicians and scholars about postgraduate education in Ghana. It is also designed to elicit proposals from these stakeholders towards re-shaping postgraduate education and training in Ghana and making it resilient in an ever changing world.

The information is going to be used for scientific purposes related to this and other associated studies. Your identity shall be confidential.

1. In what ways do you think universities in Ghana can foster and sustain a strong collaboration with the industry?
2. What do you consider as the problems bedevilling postgraduate education and training in Ghana?
3. What are the strengths, weaknesses, opportunities and threats for each of the problems you have identified?
4. In what ways can postgraduate education and training be relatively self-sufficient in terms of funding?