Human Capital Remittances from Africans in Diaspora using Information Communication Technology: The Experiences of University of Nigeria

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Abstract: Remittance of money and materials by African Diasporas contributes significantly towards sustaining the economy of African countries. Conversely, creating the platform for the Diasporas' remittance of scientific/technological know-how is the aim of the UNESCO-HP Pilot Project on reversing brain drain to brain gain. The University of Nigeria's component of the project on tissue culture adopts grid computing, webinar and other ICT media in repatriating of human capital gains (intellectual and professional expertise) from Africans residing outside the continent. Presently, the project has established grid computing laboratory as well as the webinar workstations and also hosted its website. This uncharted route has been fraught with infrastructural, low bandwidth challenges, difficulty in securing inter-university collaboration and inadequate publicity. However, the silver lining shows willingness of individual African Diasporas to key into the project relative to initiating joint researches, participating in summer lectures and exchange visits.

Key words: Human Capital, Remittance, Immigrants, African Diaspora, Information Communication Technology, Webinar, Grid computing and University of Nigeria

1. Introduction

Millions of African descents reside in all the continents of the world. They are classifiable as voluntary or involuntary immigrants. For instance, the documented populations of African immigrants (voluntary) in North America and Europe are estimated at about 3 million — about 1 million in the U.S., 282,600 in Canada and 1.7 million in Europe; the figure for Europe does not include immigrants from North Africa.) [¹]. Furthermore, the above figure excludes the involuntary immigrant population who reside in every continent and the new voluntary immigrants residing in Asia, Latin America and the Caribbean. However, within the African immigrant population is the distinguishable subset referred to as African Diasporas that contributes severally towards the development of the continent. African Diasporas consists of people of African origin living outside the continent, irrespective of citizenship and nationality and who are willing to contribute to the development of the continent [²] and not just all within the immigrant population. The dynamic interplay between their nostalgic feelings and the
mitigating realities why they cannot return home tends to sustain their development initiatives. Without going to the details on the factors that “push” people out of their home countries, and factors that “pull” them to a new or “receiving” country [3], Diasporas have made many significant contributions by these ways: providing much-needed financial support to family and communities, establishing small businesses, stimulating new home constructions and artisan enterprise development, serving as cultural ambassadors, helping to extend and maintain public infrastructure such as schools and hospitals, and their fledging sector-thematic networks are beginning to deliver services in the health and education sectors in particular [4].

Without prejudice to the immediate economic relief of the new African Diasporas’ remitted money through Western Union or Money gram on the home family there will be more long time economic growth in the continent when remittances target human capital development. Human capital, according to Marotta, Mark, Blom, and Thorn [5] is the stock of knowledge and skills inside the organization or nation that improve the nation’s prospects of engaging in innovation and R&D activities. At the national level, for example, these skills possessed by the citizens do also increase the country’s ability to absorb new knowledge and technologies. It could be extrapolated that the quality of human capital available to any country is proportional to its rate of technological and economic development. Hence there is candour in encouraging African Diasporas to focus on investment in their remittances rather than mainly on consumption [6]. For example, targeting part of the $12 billion officially recorded Diaspora remittances in 2002 [7] to programmes aimed at human capital development would have furthered the long term development of the continent rather than limiting them to bread and butter projects. It is therefore on the prospects of broadening the scope of the African Diaspora’s remittance to include intellectual and technical expertise for developing the continent’s human capital growth that informed the commencement of the United Nations Education Scientific and Cultural Organisation (UNESCO)-Hewlett Packard (hp) - University of Nigeria (UNN) pilot project initiative.

The UNESCO – HP – UNN project titled “Piloting solutions for reversing brain drain into brain gain for Africa” aims at contributing towards the strengthening of the intellectual and scientific capacities in Africa by Africans, and to facilitate the contribution of experts from the Diaspora in the service of knowledge exchange. The African project was developed by UNESCO’s Education Sector in response to requests by Member States and sequel to the success of a similar project in South East Europe. Over the past decades, African countries have suffered greatly from the emigration of skilled professionals who are estimated to be leaving the continent at the rate of 20,000 a year. This foremost African pilot project has been established in university laboratories and research centres in Algeria, Ghana, Nigeria, Senegal and Zimbabwe. It is expected to contribute to reinforcing national capacities through developing and strengthening linkages and networks between experts working away from their countries of origin and their peers and university students back home, by promoting mobility schemes and re-establishing links between university faculties focusing on Information Technology (IT) and a scientific discipline with the help of grid computing, for example.
The University of Nigeria-UNESCO-Hewlett Packard pilot project titled: Strengthening Local Biotechnology Capacity in Tissue Culture through ICT-based Research and Training Collaboration with Nigerian Scientists in the Diaspora was granted through a competitive process.

The Project has provided the hitherto non-existing platform for the alumni of the University of Nigeria and other Africans in Diaspora to connect to the intellectual needs of the University. Indeed, the UNN project was further subdivided into three major experimental sub units namely: Mushroom, Plant and Animal Cell Tissue Culture. The mushroom sub project is aimed at producing mushrooms and developing production techniques that could be marketed beyond the University. The Plant Tissue Culture is focusing on other staple foods like cassava, yam, plantain etc. while the animal tissue culture experiments focus on fractions/pure compounds using various cell lines for anti-diabetic, anti-oxidant anti-cancer tests etc. In spite of the initial teething problems, UNN has ventured to broaden the project’s scope to include but not limited to: mentoring, material donation, exchange visits, research collaborations, and summer classes/activities at the University of Nigeria with individual African Diasporas. The figure below depicts the graphic conceptual framework of the UNN project.

![Graphic Framework of UNN Project](image-url)

It is an incontrovertible fact that many an African Diaspora would not be returning back to reside in the continent yet they are longing to contribute to its growth and development. In addition, the landmark political ascension of an African Diaspora in the United States of America promises to have globally ripple effects in intensifying developmental interest towards the continent. However, the onus is still on higher institutions/governments in the continent to provide a veritable platform and ingenious means of facilitating as well as sustaining the remittance of human capital from overseas.

2. Objectives

The Objectives of the UNESCO-HP-UNN project (within one year framework) includes but not limited to:
1. Set up a website, grid computing laboratory, webinar and other ICT-based facilities for collaborative laboratory and training activities in tissue culture between Nigerian scientists in the Diaspora and the University of Nigeria Biotechnology Centre.

2. Conduct and establish research partnership with Nigerian scientists in the Diaspora on tissue culture techniques in mushrooms, cassava, local staples and other areas of common research interest.

3. Develop ICT-based training modules on tissue culture for researchers and students of the University of Nigeria and affiliate institutions, drawing from resources at the collaborating institution abroad.

3. Methodology

In order to achieve the objectives of the project, the University of Nigeria have adopted the following approaches:

3.1 Use of the Grid Network

The major activities of the sub projects are to conduct concurrent research experiments and training of staff/students that are facilitated by ICT in areas of plant and animal tissue culture. The subprojects also focus on how these activities could be leveraged through a Network Grid that entails data-intensive streaming applications executed on non-specialized communication networks. This allows for audio and video applications to take place over the grid, such as remote learning sessions (to be provided by external collaborators) and even collaborative laboratory sessions in which a large number of parties can participate.

3.2 The Project Website

The Project has developed its website (www.unn.edu.ng/unesco-hp) that is accessible to staff/students of the University of Nigeria and collaborating institutions abroad. The site hosts the publications/materials from the sub projects and other information relevant to the project.
3.3 The Webinar

The webinar is used to facilitate Web conferencing used for conducting live meetings or presentations over the Internet. The structure is such that each participant sits at his/her own computer and is connected to other participants (the African Diaspora/affiliate local universities) via the internet. It is used in organizing curriculum conference/critique workshop wherein both the lecturers of the University of Nigeria and external collaborators agree on the structure/content of the modules and other project issues.

3.4 Development of ICT-based modules

Writing of computer programmes on biotechnology modules related to the research techniques in mushrooms, cassava and other local staples production is one of the objectives of the project. In doing this, the modules are hosted on the project website and also have the standalone version on CD-ROMs when completely developed. The modules are being developed in Java because of Java’s capability of running applications across a wide variety of computing platforms (servers, personal computers, mobile phones and other devices), robustness and system protectiveness of Java virtual machine, object oriented nature and the fact that Java is open source.

3.5 Collaborative Framework

Two major collaborative frameworks have been deployed to facilitate the networking of the African Diaspora to participate in the project namely: institutional and individual. The institutional framework involves soliciting inter-university, professional organisations and research institutions collaborations with the University of Nigeria. This entails signing memorandum of understanding (MOU) with these institutions. In this framework the participating scientist is afforded the official support of his/her institutions of affiliation. While the individual framework involves enlisting the army of willing African Diaspora to participate in the project without getting his/her institution involved. These individuals dictate their terms for participating in the project that is also agreeable to the University of Nigeria.

4. Technology Description

The two principal information communication technologies that are used in this project include: the grid computing and the webinar:

4.1 The Grid Computing Technology:

Technologies involved in grid computing include Internet, computer, the World Wide Web, programming languages, and the middleware (software) that enables the user to access resources distributed over the network. It turns a radically heterogeneous environment into a virtual homogeneous one. The use of grid computing technology affords the project the following advantages:

- enables collaborations among scientists at UNN and in Diaspora on tissue culture
- ensures parallel processing capacity thus reducing the time to obtaining results
• aids online discussions with the African Diaspora at the collaborating institution when provided
• it is a single portal to distribute resources among scientists at UNN and in Diaspora.

4.2 The Webinar

The webinar is a neologism to describe a specific type of web conference. It is typically one-way, from the speaker to the audience with limited audience interaction, such as in a web cast. A webinar can be collaborative and include polling and question & answer sessions to allow full participation between the audience and the presenter. In some cases, the presenter may speak over a standard telephone line, pointing out information being presented on screen and the audience can respond over their own telephones, preferably a speaker phone. There are web conferencing technologies on the market that have incorporated the use of VoIP audio technology, to allow for a truly web-based communication. The university of Nigeria opted for the webinar because: it is less bearing on the Internet bandwidth (UNN has 1.5/4.5 Mbps) and very suitable where Internet connectivity is an issue. It can be recorded and run asynchronously and the technology of implementation is less capital intensive. An important capability of web conferencing software is application sharing, the ability for one party in the conference to share an application (such as a web browser, spread sheet, etc.) from their desktop with everyone else in the meeting and pass the control of the application to someone else in the meeting. The webinar that the University has set up has the following features:

• Slide presentations (created through PowerPoint or Keynote on a Mac)
• Live video (via webcam or digital video camera)
• VoIP (Real time audio communication through the computer via use of headphones and speakers)
• Web tours - where URLs, data from forms, cookies, scripts and session data can be pushed to other participants enabling them to be pushed though web based logons, clicks, etc. This type of feature works well when demonstrating websites where users themselves can also participate.
• Recording (for viewing at a later time by anyone using a unique web address)
• Whiteboard with annotation (allowing the presenter and/or attendees to highlight or mark items on the slide presentation. Or, simply make notes on a blank whiteboard.)
• Text chat - For live question and answer sessions, limited to the people connected to the meeting. Text chat may be public (echo’ed to all participants) or private (between 2 participants).
• Polls and surveys (allows the presenter to conduct questions with multiple choice answers directed to the audience)
• Screen sharing/desktop sharing/application sharing (where participants can view anything the presenter currently has shown on their screen. Some screen sharing applications allow for remote desktop control, allowing participants to manipulate the presenters screen, although this is not widely used.)

Generally, web conferencing is often sold as a service, hosted on a web server controlled by the vendor. Offerings vary per vendor but most hosted services provide a cost per user per minute model, a monthly flat fee model and a seat model. Some vendors also provide a server side solution which allows the customer to host their own web conferencing service on their own servers.

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5. Developments

The UNESCO-HP-UNN project held two Steering committee meetings in Maputo, Mozambique and Johannesburg, South Africa respectively to plan, train and monitor the progress made by beneficiary countries. The Trainings were held in South Africa on installation of servers, related programmes and in grid computing, EGEE and gLite, the middleware utilised by the EGEE grid. The tutorial gave participants an overview of what a grid is, the architecture of the gLite middleware, an introduction to job submission, data management and grid workflows, an overview about the concept of virtual organizations and the virtual organisation management system, as well as practical exercises on the use of gLite on the GILDA testbed with examples. The grid computing training was replicated at University of Nigeria for staff/students by the participants who attended the South Africa training. Subsequently, the UNN project committee made efforts to participate in the Catania remote grid computing training, however, the low band width problem compromised our best of intentions as we could not follow the training concurrently.

In terms of securing formal collaborations with overseas universities, the University of Nigeria is in the process of securing memorandum of understanding with some United States of America universities/organizations. However, these efforts are being hampered by bureaucratic bottlenecks and the reservations held by these universities regarding their financial benefits from this project. On the other hand, the University of Nigeria has established individual level networking of the Diasporas to participate on the project. Their responses have been very encouraging and promising.

To give the project wider publicity, the University of Nigeria attended the World Bank Open House for the African Diaspora held on November 29, 2007, Washington DC. The event was well attended by African American and African based organizations as well as individuals of African descent across North America. It was more of brain storming sessions attended by 200 representatives from groups based in the United States and Canada aimed at formulating the blueprint on the best ways of engaging the African Diasporas for African Development.

6. Results

The concrete results of the project, among others, include the establishment of human networks for information and knowledge sharing; the initiation of joint projects and exchange programmes; the strengthening of ties between students and researchers at home with the Diaspora; and the reinforcement of teaching and research capacities [8]. The University of Nigeria has engendered sufficient interest among staff and students on the use of grid computing by conducted training on the application of grid computing for the three sub projects’ experiments on mushroom, plant and animal tissue culture. We believe that the ultimate aim of the Pilot project (UNESCO-HP) in connecting all the beneficiary institutions to EGEE Grid will compensate for all initial setbacks.

The University of Nigeria resorted to the use of webinar instead of the originally proposed video conferencing owing to the limitations of available band width. The University has established the initial 10 workstations for the webinar using the WebEx software but hopes to acquire the Adobe Acrobat Connect and also uses the following hardware: Computers, Earphone, Large TFT Monitors as well as Internet, Telephone and Public Address system. The limitation of the WebEx as presently deployed in the University is that it lacks audio signals rather than the desired video and audio combination.
7. Business Benefits

There are numerous business benefits associated with this project namely, the supply of ICT software and hardware (middleware, laptops, desktops, earphones, CD-ROM, monitors telephones and public address systems), travelling deals, hospitality businesses associated with exchange visits. The Project provides the business prospects for the procurement of more grid computing equipment that will serve the greater population of the University of Nigeria and other affiliate universities/institutions within south eastern Nigeria. These institutions would need greater bandwidth in order to have more workable grid computing experiences and as such any affordable bandwidth offers to these institutions for internet and grid computing activities would be music to their ears.

Provision of dependable and steady power supply is a challenge to the University of Nigeria as well as the country. Thus there are bounteous business benefits for the supply of electricity to these institutions by use of solar panels, wind turbine, coal, etc. On the travel and hospitality dimension of the project, the exchange visits component of the project provides veritable business opportunities to the airline industry as well as hotels and local tourist businesses that service the visiting Diasporas or University of Nigeria staff visiting the collaborating institutions.

8. Conclusions

Obviously, this project has made remarkable strides in attaining its set objectives. Among other things, the lessons learnt from the project include: techniques for increasing the awareness among the faculty and students on the potentials of grid computing in global scientific enquiries, difficulties associated with securing inter-university collaborations especially when financial rewards are not involved and coping with infrastructural difficulties like irregular power supply and low bandwidth. Being an uncharted route, these initial challenges can be overcome when more resources are committed into the project and when the foreign universities show more interest in signing the memorandum of understanding with the local universities. Furthermore, since the EGEE grid is in Europe, the UNN Project would require some assistance in securing Europe based Diasporas otherwise we would need linkage to any grid in North America. Universities in Africa should do more to establish collaborations with Western universities that could always be used as platforms for international collaborations and not wait until any pending project. The World Bank can be directly approached to lend substantial support to the project which will result in more resources and leverage. The ICT divide can be reduced reasonably by affording African universities more bandwidth for the internet and other related activities otherwise the gains envisaged on grid computing in Africa and related ICT-based education cannot be realizable. It is our belief that this project possesses great potentials in transforming the intellectual landscape of African universities and no cost should be spared in making it work and extending it to more African countries.

Acknowledgements: The University of Nigeria is grateful to the Hewlett-Packard (HP) for donating the grid computing equipment to this project and to the United Nations Education Scientific and Cultural Organization (UNESCO) for facilitating the project activities and to Dr. Gordon Ibeanu, Department of Pharmaceutical Sciences (BRITE Program in Mammalian Cell Genomic Sciences), North Carolina Central University, USA for providing the foremost collaborative support on which the proposal was written.

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