Role of universities in statistical capacity building: The case of the Department of Applied Statistics at National University of Rwanda*

By
Dr. JOSE A. Mathai[1]

Abstract N.93: *In October 2004, the Department of Applied Statistics (DAS) was established at National University of Rwanda (NUR) to build the capacity for research and training in Applied Statistics. The National Statistical Institute Rwanda (NISR) is instrumental in building statistical capacity in Rwanda and has been collaborating with DAS-NUR in all these years. The ultimate performance indicator of the overall objective of the establishment of the DAS is the national and international acceptance of national Rwandan statistics for policy making, monitoring, and evaluation of development, and the analysis of socio-economic situation.*

As NSDS (National Strategy for the Development of Statistics) visualises the synergy between data producers and data users, it is important that statistical capacity building in a country dependent upon an effective system that trains the required manpower to handle the entire gamut of statistics in the way it is to be produced and used. There arises the role of University as training and research institution in producing the required manpower. The University has to attain the said objective for which it requires appropriate curricula, it has to train staff (of both national statistical agencies as well public and private sector organisations) and oversee that better data is produced and made use of for effective policy making. This paper intends to draw on the experience of DAS-NUR in this front in strengthening statistical capacity in Rwanda.

The paper also will elicit the new emphasis on quality of statistics in policy making and the need to improve the capacity of national statistical systems by way of: (i) highlighting the national statistical capacity building in Rwanda; (ii) assessment of various weaknesses and challenges facing national statistical system in Rwanda (iii) strengthening collaboration between different stakeholders in the national statistical system so as to have synergy in their operations.

The paper, therefore, is expected to contribute to the better understanding of the challenges facing national statistical system (statistical education, use of statistics in policy-making) in Rwanda and will seek to have an idea of how international statistics organizations and institutions can build capacities for statistics education which will pay way for better NSDS.

[1] Professor and Head, Department of Applied Statistics
National University of Rwanda, BP 117, BUTARE, Rwanda
Email (official): dasfem@nur.ac.rw , Email (personal): amjose13@nur.ac.rw
Phone: +25 0788539398, Fax: +25 0252 530121

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Introduction

Rwanda is developing policies that are in line with the international development agenda to reduce poverty and unemployment. Yet, especially under recent conditions of state reforms and efforts towards administrative decentralisation, the need for reliable statistical data- and the need for tools to collect such data – becomes even more urgent both for national and local governance purpose. Government agencies and politicians, academics and policy analysts, the business community, NGOs and the civil society, International organisations (like IMF, UN, AfDB etc) and other users of statistics lack and are affected by the absence of reliable and timely statistics. Unquestionably this makes national and international decision-making with respect to Rwanda's strategy for poverty alleviation and it limits facts based policy making and measurement of policies through statistics. Apart from decision-making and justification of decisions in the present, statistics are extensively used for describing and analysing the past as well as for projections for the future. Better analysis, research and policies should improve the conditions for accelerated economic development and social well being. This paper is divided into two parts. The first part is on the Department of Applied Statistics **(DAS)** at National University of Rwanda **(NUR).** This is intended to bring home the experience of an institution to build capacity in training statisticians and learn from that experience. In the second part, a brief look at the Rwandan Statistical System from the backdrop of the developing the Agricultural Statistics has been done. And lastly, in conclusion, the emerging challenges to build statistical training in Rwanda have been presented so that it will lead to a vibrant system that would meet the demands of 21st century development tasks.

PART –I

2. The Department of Applied Statistics

DAS at **NUR** was established in 2005, it started with an undergraduate programme - B. Sc Applied Statistics - which specialises three main areas viz. Applied Statistics, Policy Analysis and Demography (see Annex for the Modules of BSc Applied Statistics). The uniqueness of the programme is its link with policy analysis. Two batches from this programme, about 78, were graduated during 2008 and 2009. The department's graduates are intended to develop a culture of transparent, evidence-based policy making and implementation which serves to improve accountability and effectiveness in all sectors - public, private and the third sector - of the economy. DAS at the NUR is to enhance and sustain Rwanda's capacity to collect, develop and analyse statistics. The BSc in Applied Statistics is of great importance not only for the national economic development but also for international competitiveness of Rwandan students in evidence based policy making. Training students on different levels in applied statistics can respond to the following:

a) On the national level, the program is to address the national problems in term of socio economic development, the issue of underdevelopment, poverty alleviation, investment, economic growth, etc.
b) On regional and/or international level the students who may be able to compete in appropriate sectors
c) The needs of labour market, national as well as regional

In order to respond to the above specified requirements, DAS has developed a curricula that integrate different types of statistics (not only monetary or financial statistics), which opens the way for bringing together economic, social, environmental and demographic statistics and underscore the ***multidisciplinary approach of the DAS***. In addition to the degree programme, DAS has also framed a series of training programmes, research and consultancy to meet the enormous demands of the public and private sectors of the Rwandan economy and society.

2.1 Achievements of the DAS: 2005-2010

The consortium of the Development Research Institute at Tilburg University (UvT/IVO) and the department of Human Geography and Planning of the Faculty of Geosciences of Utrecht University (UU/GEO) are able to offer assistance to NUR through the Nuffic to attain the objectives and ambitions of Rwanda. DAS at NUR is the result of this international cooperation. The development of a reliable, functional, up-to-date and sustainable statistical system can be facilitated by improving the education capacity for statisticians at the DAS-NUR.

While the project meant for the establishment of DAS at NUR prepared the objective of the establishment of DAS as it 'intends to contribute to the adequate production and use of economic, social, environmental and demographic statistics, which may be used for policy analysis, policy formulation, monitoring and evaluation' (Development Research Institute 2005). The proposal also emphasizes that the strong relation between development of statistics and the use by analysts and policy makers. It further stresses the use of statistics in analytical data frameworks, which should guarantee their consistency in concepts classification and measurements. Statisticians, indeed, must have sufficient theoretical and scientific knowledge of one or more disciplines to be able to analyse and interpret statistical data. In tune with the objectives of the establishment of DAS, the achievements that DAS so far quite encouraging as it is training the necessary manpower to manage an efficient statistical system in Rwanda.

The DAS mission is to provide high quality education in Applied Statistics and to carry out research to the highest international standards in a spirit of community and professional service. We have made important strides towards its specific objective to "build the capacity for research and training in Applied Statistics at the National University of Rwanda" over the past five years. The Table-1 provides the intakes of students in the DAS since 2005; the total intake was 405 and 78 of them graduated in 2008 &2009. As can be seen from the Table-1 there is an increasing demand for the programme over the years (in the current year we restricted the number of students due to lack of infrastructure, especially of computers and class rooms).

Table-1: Number of current Students in the DAS –NUR and students graduated

Year 4 (2007 admission)	Year 3 (2008 admission)	Year 2 (2009 admission)	Year 1 (2010 admission)	Total current students	**DAS students who graduated in 2008 and 2009**	Total students Current plus graduated
43	124	89	71	327	**78**	405

The department's progress so far is mainly attributed to the financial support from the project "NPT/RWA/053 Applied Statistics" funded by Nuffic. As can be seen from the Table- 2 the PhDs and MSc candidates are trained with the support of **Nuffic**. African Capacity Building Foundation (ACBF) also extended the support to DAS in training its staff. Further NUR has benefitted from a series of "training of trainers" programmes supported by Nuffic in which the staffs of Faculty of Economics and Management along with DAS staff have undergone short-term training in Statistics, Demography and Policy Analysis. However, DAS still needs senior staff in the fields that it specialises – Applied Statistics, Demography and Policy Analysis- as seen most of the current staffs are at junior levels and many of them are on their training.

Table-2: DAS Staff structure, academic degree, training status, and area of academic interest

Staff Academic Grade	Number	Highest Degree	Training Status	Area of Academic Interest
Professor	1	PhD	Expatriate Staff (Head of the Department)	Policy Analysis, Development Economics
Associate professor	0			
Senior Lecturer	0			
Lecturer	6	M. Sc	5 are doing PhD	2 in Policy Analysis, 3 in demography, 1 in Applied Statistics
Assistant lecturer	4	M. Sc	1 is doing PhD	1 in Demography and 3 in Applied Statistics
Tutorial Assistants	3	2 B. Sc, 1 MBA	1 completed MBA in Aug 2010	2 in Applied Statistics and 1 in Policy Analysis
Total	14			

2.2 Research output

In the research front (in addition to the individual staff research being conducted) the DAS has four department research activities completed and one is ongoing:

- "A statistical survey on the use of reference materials in dissertations written by FEM undergraduate students" 2006
- DAS staffs are associated with the Rwanda Human Development Report 2007 published by the UNDP.
- "A baseline survey on Gender Based Violence in Rwanda" in collaboration with UNIFEM-Rwanda. 2008
- CNLS project on Impact of HIV/AIDS in the Rwanda Agricultural sector was completed in August 2009.

- DAS staff are associated with the Utrecht University project (funded by HEWLETT foundation) "**Population, reproductive health and economic development"** (approved in January 2009), the work is progressing very well.

The research output of DAS has to be evaluated after taking into consideration the training status of most staff as 10 out of 14 are at various stages of training. All DAS faculty members are professionally engaged and active; there were 8 publications by DAS staff during this period. Considering the teaching and service loads for the department faculty, we believe the research performance is good.

2.3 Community Service

The NUR's mission envisages three main aspects which are: Education, Research and Service to Community. NUR must achieve its threefold mission through strong initiatives and creativity. It has always been said that "the university does not go beyond its classrooms/campus". A "bridge" therefore is proposed to clear the chasm between NUR and the Rwandan community –the National Community Service (NCS) is a DAS attempt in this respect to strengthen the link between the Department of Applied Statistics (DAS) and the Community through activities that impact positively on the Socio-economic welfare of the citizens by inculcating the spirit of Community Service among students and staffs of DAS –NUR. NCS integrate **study** *and* **service, theory** *and* **praxis.** The DAS activity is to enable the students to play an important role in planning, designing, executing, monitoring and evaluation of local development projects.

To reach the community DAS-NUR is taking up many activities along with ASSA (Applied Statistics Students Association). The notable achievement recently was the National Community Service (NCS) camp that was successfully conducted during the semester break, May 25-30, 2009 at Gisagara District, Rwanda. Currently ASSA (on an ongoing basis) is doing an evaluation of the 'Quality of Teaching and Learning at Faculty of Economics and Management' which is a novel attempt at NUR and it intends improve the academic standards at NUR.

2.4 Networking

Several members of the DAS have established strong and admirable ties with the local community. DAS has signed a memorandum of understanding with NISR (National Institute of Statistics, Rwanda) with the objective of collaboration in all fields – teaching research and extension activities of DAS. An important element in our strategy is to expand the external network of DAS-NUR and increase awareness of its existence in the region. DAS and NISR jointly organised an international seminar in September 23-25, 2009. The new emphasis on ***quality of statistics in policy making*** and the need to improve the capacity of national statistical systems tempted us to organise the international seminar in order to: (i) highlight the national statistical capacity building in Rwanda; (ii) assessment of various weaknesses and challenges facing national statistical systems; (iii) gather and assimilate the latest developments and information in the subject area of Applied Statistics, Demography and Policy Analysis; (iv) strengthen evidence based policy making in Rwanda; and lastly (v) to strengthen collaboration between different stakeholders in the national statistical system so as to have synergy in their operations. We feel that improvement of the DAS's image is crucial to its future development and marketing of its products.

The achievements listed should not underestimate the need for substantial amount of work that still needs to be done in certain areas. The critical challenges ahead are various. First, staff availability is likely to remain a problem for the upcoming two years (although decreasing over time), due to staff training abroad. The programming of courses and the attraction of qualified lecturers for the same is a sizeable task facing the Head of Department, which requires tight scheduling and intensive negotiations with other departments.

Second, attracting and retaining high-quality staff is also a continuous cause of concern as success on this count is to a large extent determined by whether overall working conditions at NUR can compete with those of public and private sector jobs elsewhere in the country (or even abroad). Failure to retain staff can strongly (and negatively) impact on the opportunities to build upon the DAS's past achievements. Finally, research has so far been mainly an individual affair (especially, though not exclusively, in the capacity of M.Sc. and Ph.D. candidates), but cannot be considered a core activity of the Department as yet. The establishment of a broader research culture is a daunting task, given the common practice of research assignments being awarded to individuals (through personal contracts) rather than to entities spanning a group of individuals. Besides, staff members tend to carry a rather heavy load of teaching, which limits the time for research.

Though the DAS offers a comprehensive and high-quality set of taught programmes, the students have complains about the computer lab as maintenance of the machines as well as availability of the lab for practice happens to be their main concern. There is considerable concern among the DAS staff about the inadequacy of their office accommodation; it is very cramped. Also, as stated earlier, there is dearth of senior professors in the department and many young lecturers are not available on full-time as they are undergoing training.

Having these bottlenecks are not deterring us in looking forward to overcome all of them and pave way for more efficient and broader services from DAS to the aspiring knowledge seekers within Rwanda as well as from the region. With this outlook in mind we propose the plan of action in expanding DAS activities with the support of all stake holders.

2.5 Plan for expansion of the activities of the DAS: 2010- 2015

In spite of the efforts made from 2005 till now, there are still a lot to do to meet the manpower requirements of Rwanda in the areas of Applied Statistics, Policy Analysis and Demography. One important area identified is to have pure applied statisticians trained at post-graduate level by imparting training in (i) critical awareness of the application of modern Statistical techniques to a variety of problems, and (ii) the ability to use a range of computational tools and packages. The **M. Sc in Applied statistics** meant to cater the needs of senior level officers in government, private and non-government organizations in the country and in the region.

The second post-graduate programme that we are aiming at is the **M. Sc in Population Studies**. Rwanda is aware of the population growth threat and the post-graduate programme in population studies is intended to strengthen the country's capacity in evolving a strong population policy as well as its implementation. This programme not only intends to cater the needs of Rwanda but also of the region.

The third and the crucial area that we want to strengthen in the years ahead, and we feel this is an also area wherein there is dearth of experts in the region, is the Policy Analysis. We intend to start a **M. Sc in Policy Analysis** whose beneficiaries would be the organizations and institutions serving all sectors of the economy.

In addition to the post-graduate programmes that are planned, we also intend start two other programmes: (i) ODL (open and distance learning) in Applied Statistics (intended to reach the entire nation) by offering the B. Sc degree in Applied Statistics & Policy Analysis; and (ii) Short-term training programmes in Applied Statistics, Demography and Policy analysis (intended to the existing service personnel of the public, private and non-governmental sectors, as we identified that there is lot of demand in this area).

The DAS has educated 78 successful alumni, and they justifiably proud of their alma mater. Good alumni can be an excellent resource for DAS and feel that the DAS should compile and maintain a good database of its former students in the years to come. Regular contact with past graduates (for example through a regular DAS newsletter) can be very useful in providing links for work experience and job opportunities, but also as a vehicle for making sure the image of the DAS is maintained externally at a justifiably high level.

The establishment of ASSA and the formulation of a policy on staff availability, as suggested in the NCHE (National Council for Higher Education) documents, would promote good staff-students relationships. Many staff use anonymous student surveys to obtain feedback, and we recommend that these be used in each module taught by the DAS.

In the years ahead, with the above stated broad goals of the department, we intend to build a strong Department of Applied Statistics at National University of Rwanda. Therefore, we seek support from all stake-holders who are concerned of the development of Rwanda as well as the region in general as *there is a need for statistical training programmes to cover the entire statistics value chain with increased emphasis on data analysis and reporting in order to enhance data usability.*

2.6 Engagement Opportunities

We planned to start a Statistical Consulting Centre which could expand its mission and activities to include external clients. The Centre could play a key role for the DAS and University in meaningful engagement with the business community. Expansion of mission and activities has the potential to serve external clients and establish two-way engagement with the business and other communities, create synergies with other programs in the DAS and other department, and enable research and learning for the faculty and students involved.

PART –II

3. Rwandan Statistical System and Agricultural statistics

The entire gamut of the current thinking on the relevance of statistics can be understood very well from an observation of Prof Ben Kiregyera: 'It is very important to mention that the new focus on evidence-based policy in the context of MfDR (Managing for development results) has put statistics on the front burner of development discourse and processes. Statistics has now been elevated from being just a technical issue to a high ground of development issues (PARIS21, 2006). This has led to new demands on both data producers and users, and the need for them to change their mind-sets. Data producers now need to understand development issues, policies and processes; they need to understand the policy environment in which they produce statistics; and more importantly, they need to learn more and understand well what it is that they are expected to monitor and measure' (Kiregyera 2009). The entire issue of a good agricultural statistics revolve around this understanding. Therefore, to make agricultural statistics more policy relevant and responsive is the need of the hour which may produce good statistics for relevant and current data needs.

In Rwanda, the Ministry of Agriculture and Animal Resources (MINAGRI), in collaboration with Rwanda Agricultural Development Authority (RADA), the National Institute of Statistics of Rwanda (NISR), FAO and WFP organizes, each agricultural season, a crop assessment survey. One of the objectives of this survey is to estimate the food balance and plan for food requirements within the next six months. Also, results from this exercise are used in the estimation of the gross domestic product (GDP) and the contribution of the sector in the national economy. In addition, another source of agriculture statistics is the comprehensive National Agriculture Survey (NAS) conducted in 2008 by NISR intended to capture agriculture production in Rwanda and serve as benchmark for future surveys.

In Rwanda, the issues of agricultural statistics have been reported by many researchers before (Donovan 2008, Mpyisi 2002, Kelly and Donovan 2008). In Rwanda, challenges of crop area measurement are often compounded by the complexity of cropping systems which often involve mixed cropping, continuous planting and harvesting, etc. The practice of planting crops in mixtures makes it difficult to properly measure the area under crops in the mixture, particularly when there are no established norms or information to apportion area to constituent crops in mixtures. It is usually proposed that seed rates for each crop in the mixture should be used to apportion area to constituent crops in the mixture. Usually, subjective methods are used to apportion area under mixed crops and this does not inspire confidence in area estimates (Kiregyera, 2002).

3.1 Key agricultural statistics and contribution of the agricultural sector in the national economy

Agriculture features prominently in the Rwandan economy, and currently accounts for 34 percent of GDP in the year 2009 (NISR, 2010). Agricultural commodities, mainly tea and coffee, generate 70 to 90 percent of total export revenues (tea and coffee, generate 34 and 44 percent of total export revenues respectively for the year 2008 and 2009). In addition, productivity in many

staple crops and livestock sector has remained flat, while average farm sizes have declined, leaving many farmers' incomes lower than they were during the pre-genocide period. Because Rwanda's economy is heavily dependent on agriculture, the key to poverty reduction lies in stimulating rapid and sustainable growth in the agricultural sector.

3.1.1 Contribution of the agricultural sector in the national economy: The contribution of agriculture in the GDP still remains very important. The level of growth within the sector has remained relatively high during 2006 – 2008 for it has gone through a 3% growth in 2006, 3% in 2007, 6% and 8% in 2008. Such growth is attributable to an increase of arable lands ; but also to and chiefly to different initiatives aimed at increasing productivity ; notably the initiatives by the Rwandan Government in planning and using swamps, in providing improved seeds and other agricultural entrants.

Food crop production forms the majority of the agricultural sector. Export crops (coffee and tea) are still a very small proportion of the sector. On the basis of 2008 statistic data, within 34% of the GDP represented by the contribution of the agricultural sector, 29% stem from food crops, 1% export crops, 2% livestock, 3% forestry and 0.003% fisheries

3.1.2. Agriculture production domain in Rwanda: Data from the agriculture survey (NISR 2009) shows that the bulk of the agricultural production meets the consumption needs of farmers alone. As for food crops, sale is less than 50% except for fruit category (52.3%). For the overall production, self consumption is estimated at 59% of the whole food products.

3.2. Proportion of households drawing profit from incomes generated by the agriculture sector

3.2.1. Proportion of farmer households in the overall country: In 2008, the number of farmer households in Rwanda amounted to 1,674,687 holding 85% of the whole Rwandan population, which was estimated at 9,831,501.

3.2.2. Characteristics of farmer households: In 2008, heads of families' farmer women represented 27% overall and those who can read and write only represent 30%. The literacy rate of farmer households is weak because 37.8% of heads of households can neither read nor write, 7.4% only can read and only 54.8% can read or write. The level of literacy of the heads of farmer households is not very high because only 7.9% among them had been able to go beyond primary school. Farmer women heads of families who out passed primary school simply account for 4%.

3.3. Proportion of the agriculture sector labor force in the global work force

According to the results from the survey EICV II, the proportion of the agricultural work force in the global work force represents 78.8% for the overall country. These proportions vary according to the place of residence. Accordingly, in Kigali city, farmer workforce represents 14.2% of the total workforce; in the remaining cities it represents 55% and 86.5% in the rural area.

3.3.1. Main activities of farmer heads of households: According to the national agricultural survey 2008, the agricultural exploitation activity as such is most of the time incumbent to the

farmer heads of the family, say 90.4% in the overall (88,6% for male heads of households and 95.1% for female heads of households).

3.3.2. Secondary activities practiced by the farming population: Many farmers, heads of households exert secondary activities in addition to their main activity. This is the case of 43.7% of them. The main practiced secondary activities range from agricultural manual work (7.9%), tradesmen (5.9%), independent artisans (5.5%), non- agricultural workforce (3.9%) and house servants (3.9%).

3.4. Use of natural resources in the agricultural sector

3.4.1. Use of plots for farming purposes (arable land, urban space): The total area occupied by agricultural exploitation is 1,280,750 ha, thus accounting for the half of the total surface of the country, which amounts to 2,531,310 ha. From the agricultural survey it is observed that a little more than two-thirds of the farming lands are used for food crops, that pastures and grazing lands occupy 10% of arable land. So do afforestation areas. Only 6.7% of agricultural lands are kept in fallow. The average surface of agricultural exploitation is very small size. Thus, 56.85% of exploitations occupy less than half a hectare (<0.5 ha), exploitations of two hectares and above only represent 6.2% in the overall. Furthermore, on the average, each exploitation is made up of different land blocks.

3.4.2. Use of water for agricultural purposes: Water supply for crops is very limited. The agricultural survey results shows that the main mode of supply is rain water (98% arable lands), next comes drainage (1% of arable lands), irrigation canals (0.6% of arable lands) and watering (0.4% of arable lands). In fact, it is worth taking into account that the greatest majority of agricultural exploitations are located on hillsides and that only 15.8% are situated on valleys and 2.2% in swamps. In the same vein, the applied farming technique is the traditional one in 99.9% of agricultural exploitations.

3.5 Agriculture, environment and natural resources sector statistical system in Rwanda

Rwanda's statistical capacity was severely weakened by the civil war and genocide, which took place during 1990–94. These events weakened Rwanda's institutional capacity and made it difficult for the country to absorb assistance. Assistance absorption was particularly difficult in the real sector. Real sector statistics continue to rely heavily on donors' financial assistance and experts to finance surveys and produce data (IMF 2009). There are concerns from many corners about the system of agricultural statistics in Rwanda (Mpyisi 2002, Republic of Rwanda. 2007 and 2008, Donovan 2008, IMF 2009). Mainly the concerns centred around a system that is commonly agreed upon as there were many players (earlier MINAGRI and MINECOFIN and present-since 2005- NISR, in collaboration with MINAGRI, MINECOFIN and FAO) in the generation of agricultural statistics. Each Collects data for own use with results that do not always agree – and limited ability to share data. As a matter of fact, there was a need to integrate agriculture into national statistical system in order to:

- Avoid duplication of resources for frames, data collection, analysis
- Avoid different data bases and conflicting numbers
- Provide linkage between agriculture, land use, the environment, and household income
- Improve statistical capacity, combine and focus scarce resources

NSDS (National Strategies for the Development of Statistics) is conceptualized to strengthen the information backbone of EDPRS – (Economic Development and poverty Reduction Strategy)[2] that will provide the relevant indicators to be used in formulating, updating, monitoring and evaluating the strategies and targets of the country towards Vision 2020[3].

NSDS document is a blueprint of the programs, projects and activities of the National Statistical System (NSS) to be pursued from the year 2009 to 2014 in major sectors of the society. It shall serve as the framework for mobilizing and allocating resources to support statistical activities. The development of the NSDS was done in consultation with key stakeholders in the government, private sector, civil society and development partners. For the program period 2009-2014, NSDS shall cover all sectors similar to the EDPRS grouping.

The Agriculture Sector Statistical System as discussed within the framework of NSDS is based on the EDPRS programs and comprises of statistics on Crops, Livestock, Poultry, Fish and other agricultural products including the following four (4) program components:

- Production Systems and Services
- Technical and Organizational Capacity of Farmers
- Commodity Chains and Agri-business
- Institutional Framework Development at all levels

As far as statistics on environment and natural resources are concerned they cover statistics on the five component programs of the EDPRS on environment and natural resource management: land, environment, forestry, water and mines.

As stated within the framework of national strategies for the development of Statistics (NSDS 2009-2014), overseeing the Agriculture Sector Statistical System is the MINAGRI which is mandated to define policy, setting standards, regulating, resource mobilization and monitoring activities in the sector. MINAGRI works in partnership with national government agencies, local government units and the private sector. While the Ministry of Natural Resources (MINERENA) is the coordinating and primary implementing agency for this Sector, within MINERENA are its implementing institutions like (Rwanda Environment Management Authority) REMA, (National Land Centre) NLC, Rwanda Geology and Mines Authority (OGMR), and National Forestry Authority (NAFA).

In developing the Statistical Framework of the Agriculture, environment and natural resources sectors, the indicators were formulated based on the program components of the Sector. The EDPRS, other programs in the Sector, as well as those prescribed or monitored by international organizations such as Food and Agriculture Organization (FAO) and East African Community (EAC) were used as references.

In support of the EDPRS target outcomes for the Sector and MDG indicators, the following have been identified as indicators to be monitored (Refer to 2008-2012 EDPRS Documents and 2008 EDPRS Annual Implementation Report):

- % of agricultural land protected against soil erosion
- Area of marshland developed for agricultural use*

[2] EDPRS set outs the country's objectives, priorities and major policies for the five Years (2008-2012)
[3] Vision 2020 is a road map for sustainable development by year 2020

- Area under irrigation
- % of farm households using modern farming methods such as fertilizers
- Production (in metric tonnes) of key food security and export crops
- % of livestock in intensive system
- % of Rural households with livestock
- Farm households to extension worker ratio
- Area of land protected against soil erosion
- % of national forest cover
- Proportion of area of privately owned land held under written title
- Area of land protected to maintain biological diversity
- Ratio of Area Protected to Maintain Biological Diversity to Surface Area (%)
- Proportion of the Population with Sustainable Access to an Improved Water Source
- Proportion of the Population with Access to Improved Sanitation.

3.6. Current Situation

3.6.1. Data sources and activities: MINAGRI is the major source of data for the agriculture sector. On a regular basis, it generates statistics mostly derived from administrative reporting forms regularly furnished by districts staff responsible for agriculture. In addition, statistics from the sector are produced from periodic surveys and other information systems such as:

- A seasonal agriculture assessment is conducted by MINAGRI with key partners including the NISR. Seasonal early warning system that provides information on crop forecast- this monitoring system plays an essential role of providing warning signals. Data is collected on selected indicators related mainly to inputs of agriculture in the districts.
- A more comprehensive survey, the National Agriculture Survey is conducted by the NISR to provide baseline data useful for the assessment/forecast. The survey provides quantitative information on the different salient features of agriculture and animal resources such as: crop production, land utilisation and livestock estimates. The latest NISR survey was conducted in 2008.
- A Horticulture Survey was conducted by the Rwanda Horticulture Development Authority in 2008.
- Comprehensive Food Security and Vulnerability Assessment (CFSVA) provides data on food access and vulnerability pockets. This is conducted by NISR.
- Market Information System (MIS) that provides data on selected items in selected rural markets.

MINAGRI maintains a Data and Statistics Page in its website. It also publishes an Annual Crop Assessment Report and other project reports.

Regarding environment and natural resources sector, MINERENA is expected to provide the major data for this Sector. There are few statistics available. Baseline information is compiled through its various projects led by its service institutions. Special studies are also conducted such as the Integrated Environment Assessment (IEA) in 2006 and a Land-Use Survey which is on-going. Other sources which can be tapped are the National Agriculture Survey, Food and Vulnerability Assessment, the EICV (The Integrated Household Living Conditions Survey) and PPI (Producers Price Index) Survey of NISR.

3.6.2. Organizational structure

The Ministry of Agriculture's organisation chart provides a Planning and Capacity-Building Unit which includes Statistics and GIS as one of its functions. The Unit shows one post of a biometrician in the directorate of planning. An ICT Unit is also part of the structure.

3.7. Statistical Development Programs, Activities and Projects, 2009-2014

In response to the above issues and challenges, the following programs, projects and activities shall be implemented.

3.7.1 Data Production and Management:

Agriculture sector:

- Conduct a National Agriculture Survey every 5 years and improve the design learning from lessons in the past surveys
- Conduct an annual Cross-Border Trade Survey on agro-production
- Improve the compilation of administrative-based statistics and the forecasting/estimation methodology for crop and livestock production
- Sustain the implementation of the Market Information System and other complementary studies

Environment and natural resources sector:

- Explore further the existing administrative-based data systems such as on land registration to produce relevant statistics;
- Study the possibility of developing an Environmental Accounting System to provide a more systematic way of measuring changes in the environment and natural resources

3.7.2 Information Dissemination and services to users

Improve publication of regular statistics

3.7.3 Coordination

- Strengthen the coordination and information network between NISR and MINAGRI and among counterparts in all districts to improve relevance, quality and timeliness of statistics.
- Strengthen coordination between MINERENA and NISR and among the counterparts in government agencies and private sector to improve relevance, quality and timeliness of statistics

3.7.4 Capacity-development

- Conduct Statistical Training for the staff particularly on data capture and data analysis
- Create additional Statistician positions in the organizational structure of MINAGRI, MINIRENA and other line institutions as may be appropriate
- Develop the capacity to implement an Environment Accounting System

4. Areas of concern in agricultural statistics in Rwanda

In Rwanda, the following have been identified as key issues and challenges on the agriculture sector statistics:

i) how to produce timely agriculture statistics based on international standards and scientific methodologies (clearly there is a need to improve on the completeness, timeliness, accuracy, and relevance of agriculture statistics but also to improve the Agriculture Survey methodology and crop assessment methodology);
ii) how to improve coordination among the statistical producers;
iii) how to produce statistics that could be used at lower geographical levels when decentralization is taken as a pole of development;
iv) how to produce statistics on natural resources; how to production and use of statistics with gender perspective; and how to allocate adequate resources for producing agricultural statistics by the governments and partners in due time.

In relation to agricultural statistics, it should also be mentioned that no appropriate methodology has been developed for estimating production of root crops in spite of their relative importance to food security in many African countries. For instance, cassava is a very important crop**,** providing food, income and employment for about 500 million people in Africa, Asia and Americas. Cassava is an important crop in 30 African countries. It is estimated that about 200 million people (half the population of Africa) eat cassava daily. What makes cassava such an important crop in Africa or anywhere for that matter is that it grows in soils with low fertility, does not require chemical fertilizers and is more resilient to pests and diseases, is drought resistant, there is certainty of some yield, there is a possibility of continuity of supply throughout the year, it has many end uses (human consumption, animal feed, industrial application) and can be used as an emergency crop. A correlation has been established between levels of poverty and importance of cassava; making the crop a candidate for commodity-based approach to poverty alleviation. However, there are characteristics of the crop which make its production estimation difficult, including its continuous planting, cassava fields have the crop at different stages of maturity, the crop is often harvested "piece-meal" and the crop can be stored in the ground for many months when it is ready for harvest. Because of these characteristics, there is a tendency to subjectively estimate cropped area and yield of the crop. While consumption approach may be better methodology for estimating cassava production, the approach is very resource intensive, making it difficult to carry out consumption surveys frequently.

The following have been identified as the operational issues and challenges on the Agriculture Sector Statistical System:

i) Need to improve on the completeness, timeliness, quality/accuracy, and relevance of agriculture and food security statistics,:
   - Reliability and comprehensiveness of the forecast methodology; There is a need to improve the methodology and to use an updated baseline.
   - Need for cross-border trade data for a more comprehensive analysis of the situation
   - Delayed submission of field reports affects the timeliness of the production and dissemination of statistics.

- Need to improve the design of the National Agriculture Survey
- Need for regular food security indicators

ii) Funding of survey undertakings at the frequency and level of disaggregation required is inadequate.
iii) Need to enhance the dissemination and appreciation of agriculture statistics in policy formulation and decision-making.
iv) Need for more statistician positions and statistical skills among staff to initiate, plan, and implement data collection activities including the analysis and interpretation of data.
v) Need to carry out agriculture census every 10 years as recommended by FAO.
vi) Need to shorten the periodicity to produce agriculture survey to less than once in a 5 year period.

Regarding environment and natural resources sector, the following have been identified as key issues and challenges:

i) There is inadequate statistics on environment and forestry; the challenge for ENR indicators is the measurement. An environment estimation/accounting system needs to be developed
ii) The regularity of the ENR (Environment and Natural Resource) indicators poses a challenge since most of them were produced from externally-funded special studies.
iii) There is a need to improve accessibility of statistics by disseminating them in the institutions website and publications and making use of information technology.
iv) There is inadequate statistical skills in the ENR institutions

4.1 Emerging challenges to build statistical capacity in Rwanda: Role of DAS-NUR

The DAS is in general agreement to amplify overall program quality, curricular changes (by the needs of the students and other programs), and expansion to post-graduate programmes and conduct of short-term training programmes as per demand from the stakeholders. Government of Rwanda knows that agricultural statistics had an important role to play in support of policy decisions, helping to understand how resources, production, returns, and household income were distributed among the population; and how farm and rural households made choices and responded to change. It is worth noting that training plays a very important role in improving the capacity of national agricultural statisticians. It is also important that training is not only limited to technical aspects but also covers the management of the agricultural statistical system. The DAS at NUR intended to fill this gap in Rwanda by joining hands with NISR with the support of international institutions that are striving to make perfections in agricultural statistics around the world.

5. References

Development Research Institute. 2005. *Application NPT/RWA/53: Netherlands programme for institutional strengthening of post secondary education and training capacity*. Tilburg: Tilburg University.

Donovan Cynthia . 2008. *Agricultural Statistics in Rwanda: key aspects of institutional organization and performance*. Accessed on 1-09-2009 from www.aec.msu.edu/fs2/papers/idwp95_**Rwanda**_appendix4.pdf

FAO. 2008. *Independent evaluation of FAO's work and role in statistics*. Rome: FAO

FAO. 2009. Global strategy to improve agricultural statistics. Draft with FAO status included. Accessed from 1-09-2009 *www.**fao**.org/...**global_strategy**.../**global_strategy**_document_20090622.pdf -*

International Monetary Fund . 2009. *Evaluation of technical assistance to post-conflict countries: Mozambique and Rwanda.* Prepared by the Statistics Department , Approved by Adelheid Burgi-Schmelz February 18. Accessible at www.**imf**.org/external/np/pp/eng/2009/021809A.pdf

Kiregyera. 2009. Statistical Education and Development in Rwanda: Retrospect and prospects. Proceedings of the seminar, sptember 23-25, Butare: Department of Applied Statistics, NUR.

Kiregyera. 2002. Assessment of national agricultural statistical systems and their capacity to meet PRSP requirements. Seminar on a new partnership to strengthen agricultural and rural statistics in Africa for poverty reduction and food security, 16-17 September. Paris.

Kelly Valerie and Cynthia Donovan. 2008. *Agricultural Statistics in Sub-Saharan Africa: Differences in Institutional Arrangements and their Impacts on Agricultural Statistics Systems A Synthesis of Four Country Case Studies*. MSU International Development Working Paper No. 95 October 2008 accessible at *www.aec.**msu**.edu/fs2/papers/idwp95.pdf*

Loveridge Scott, Alastair Orr and Abdoul Murekezi. 2007. *Agriculture and poverty in Rwanda: A Comparative Analysis of the EICV1, EICV2, and LRSS Surveys***.** Natural Resources Institute, Michigan State University, Oxford Policy Management.

Mpyisi Edson. 2002. *Estimation of area and production of root and tuber crops in Rwanda*. Paper presented at the FAO expert consultaion on root crop statistics, held in Harare, Zimbabwe, December 2-6. Accessed on 25-08-2009 from www.aec.msu.edu/.../**Rwanda/mpyisi**_paper_14_**root_tuber_crops**.pdf

Republic of Rwanda. 2007. *NISR strategic plan 2007 - 2011*. Kigali: National Institute of Statistics. Accessible at *unstats.un.org/unsd/dnss/docViewer.aspx?docID=2296*

_____. *2008. Rwanda: Institutional development. PSTA?EDPRS programme-4. Kigali : MINAGRI. Accessible at www.nepad.gov.rw/.../**Rwanda**%20Brief4%20Institutions%20Final.pdf*

_____ . 2007. *National accounts, 1999 – 2005: Estimates based on 2001 benchmark*. January. Kigali: NISR

_____. 2010. *National Agricultural Survey 2008*, Kigali: National Institute of Statistics of Rwanda.

UNSC. 2009. *Report on Global Initiatives to Improve Agricultural and Rural Statistics*. prepared for discussion at the 2009 UNSC.

THE WORLD BANK. 2008. *Tracking results in agriculture and rural development in less-than-ideal conditions : A sourcebook of indicators for monitoring and evaluation*, Global donor platform for rural development, Food and Agriculture Organization of the United Nations:

The World Bank. nd. *Building Statistical Capacity to Monitor Development Progress*. WP No:35292

The World Bank , OECD. nd. *Emerging good practice in managing for development results* first issue. WP No: 48390

Appendix:

BSc. Applied Statistics

PROGRAMME SPECIFICATION

January 2010

The BSc programme in Applied Statistics at the National university of Rwanda is to enhance and sustain Rwanda's capacity to collect, develop and analyse statistics especially in the areas of Policy Analysis and Demography. The Bask in Applied Statistics on different levels is of great importance not only for the national economic development but also for international competitiveness. Indeed, as the world economy is characterized by the economic liberalization and globalization, training students on different levels in Applied Statistics can respond to this requirements. More specifically:

- Build the capacity for research and training in Applied Statistics.

- On the national level, the objective of the program is to address the national problems in term of socio economic development, the issue of underdevelopment, poverty alleviation, investment, economic growth, etc.

- On regional and international level, the issue of competitiveness has to be addressed in this program. The program should be able to train the qualified students who may be able to compete on regional and/or international level in appropriate sectors.

The program also organized according to the need of labor market. In order to respond to the above specified requirements, the Applied Statistics program contains two areas of intensive training – Demography and Policy Analysis.
The learning outcomes of the programme, among other things, give an in-depth and systematic understanding of key aspects, principal theories and concepts, of the Applied Statistics/Demography/ Policy Analysis domains; and the student should be able to identify and solve professional level applied statistics problems in familiar and unfamiliar contexts.

From the Academic year 2008, the Department of Applied Statistics adapted the module system.
The details of the modules of the program are presented in the following table:

B. Sc Applied Statistics (DAS-NUR), Summary details of Modules

Sl. NO.	LEVEL	Year	Semester	Module code	Module Title	Number of credit	Number of student hours	Module Summary
1	level-1	1	1	**ECO1101**	Study skills for students	15	150	Skills for students are a semester, compulsory module aimed at: developing students' academic literacy, and introducing students to a range of learning strategies that help to learn independently. The module is shaped through ongoing discussions with faculty to ensure that many of the tasks prescribed in the module develop skills needed by students in the faculty. It equips students with skills and knowledge needed beyond the first year of the university studies and for the world of work. The objectives of the module are to help students to build their confidence as learners, to give learners an insight into the learning skills they need to develop in order to progression into Higher Education learning, and to enable students to develop learning skills appropriate for university level study
2	level-1	1	1	**ECO1102**	Principles of Economics	15	150	This module provides an essential, simple, useable body of economic theory, which will both provide the basis for further study and equip students with a real understanding of the role of economics in business, public and private policy/decision making
3	level-1	1	1	**MGT1103**	Information technology	15	150	This module is intending to impart knowledge on study, design, development of computer applications, particularly software applications (word processor, spreadsheet and presentations) and introduces to the basics of computer, hardware concept
4	level-1	1	1	**DAS1101**	Basic Mathematics	15	150	This module introduces students to the general aspects of algebra, mathematical calculus and mathematical analysis. It strengthens the students' capability to understand and solve probabilistic, business and economic problems using basic mathematical concepts.
5	level-1	1	2	**MGT1201**	Introduction to Management	15	150	The main aim of the module is to enlighten the students on the concept, nature of management and contributions made by various management thinkers. It also enables the students to understand the functions of management – planning, organizing, staffing, leading and controlling. It further helps the students in developing managerial skills; thereby they can apply the principles to any organization in their practical life.
6	level-1	1	2	**MGT1204**	Economic and Social Environment	15	150	The objective of this module is to enable the students to know the external and internal environments of business in a global context and also their interface. It makes the students to have a clear understanding of the Rwandan economic framework and its various sectoral developments. It equips students with the concepts of the socio-economic environment in general and that of Rwanda in particular.
7	level-1	1	2	**MGT1202**	Basic Accounting	15	150	Introduces the student to the basic accounting procedures involved in the production of a business entity's financial statements and enables them to understand the basic concepts of accounting science. Students will be able to acquire skills in the preparation of financial statements.
8	level-1	1	1	**DAS1202**	Introduction to Statistics	15	150	Statistics is essentially a decision making tool. Therefore, the module of introduction to statistics intends to: (i) Impart knowledge on fundamental statistical concepts and how to convert data into information, which enables policy makers, managers, and researchers to make informed decisions, (ii) Enable students to acquaint themselves with basic statistical measures. The module covers the following topics: Statistical concepts, Data and variables, Frequency distributions, Diagrammatic and graphical representation of data, Measures of location, Measures of dispersion, Measures of linear relationship, Index numbers and Awareness of statistical analysis soft wares.
9	level-2	2	1	**DAS2103**	Macro Accounts for Policy analysis	10	100	This module is the first of five modules in the Policy Analysis stream of the B.Sc. Applied Statistics programme. The module introduces students to the essentials of policy analysis and to System of National Economic Accounts (SNA 93). The students will be learning basic analysis of integrated data sets based on SNA.
10	level-2	2	1	**DAS2104**	Probability	20	200	This module aims to introduce students to applied probability in statistics and in policy analysis issues at both micro and macro levels. Students become familiar with uncertainty and Probability computations and application to problem solving in the areas of statistics, demography and policy analysis.

11	level-2	2	1	**DAS2105**	Advanced Mathematics and programming	20	200	This module completes the module of "Basic Mathematics" by focusing on multivariable calculus and applications of matrix algebra in mathematical and statistical computing, on one hand, and it provides students with a strong useable body of computer programming with mathematical and statistical packages, on the other hand.
12	level-2	2	2	**DAS2106**	Introduction to demography	10	100	This module initiates students to a basic knowledge of demography as a scientific discipline, its origin and its contribution to academic researcher. Relating mainly to the construction of a correlation between reproductive behavior (Population) and economic development/planning, it shows different stages of demographic transitions with related policy alternatives as stated by different scientists including Thomas Malthus and his pro- or cons-disciples with a focus on the demographic transition in Africa and Rwanda in particular. The module further introduces students to essential demographic techniques as a pre-requisite to the second module.
13	level-2	2	2	**DAS2207**	Population dynamics and development	20	200	The module introduces students to the basic techniques of formal (statistical) demographic analysis. All demographic sub-fields will be covered at a basic level: marriage, fertility, mortality, population growth, migration, as well techniques and purpose of standardization and evaluation of data. It aims at familiarizing students to theories of the interrelationship between population, resources and development as well as to the complexities of interdisciplinary nature of population and economic development, and to population policies.
14	level-2	2	2	**DAS2208**	National Economic Accounts: frameworks, Compilation and Data Management	10	100	The aim of the module is to show how macro accounting can be used as an instrument to relate economic theory and analysis in general with statistical development. In support of this, the course lectures will (a) alternate between and thus integrate elements of SNA analysis, compilation and economic theory, (b) use SNA data of selected African countries when presenting the analysis of SNA data and, (c) Use Rwanda data, when presenting the basics of the SNA framework, classifications, concepts and compilation. A further aim of the module is to show how Macro Accounting (MA) -and in particular economic SNA analysis- can be used as an instrument to relate statistical development with economic theory and analysis in general. In support of this, the course lectures will use National Economic Accounts data (SNA) of selected African countries to illustrate the basics of the SNA framework, classifications, concepts and compilation, and the use of economic SNA data in economic analysis.
15	level-2	2	2	**DAS2209**	Intermediate Accounting	10	100	This module intends to introduce students to concepts of capital, Revenue and expenditure. Further students are introduced to the concepts of Reserves and provisions for bad debts and their impact on the final accounts. This module also aims at bringing student to different transactional treatment of different business arrangements like; bills of exchange, royalties, hire purchase/Installment selling, consignment, partnerships, and company accounts. In intermediate accounting, the student is expected to come out with adequate knowledge on how to treat a business transaction from the time it is born up to its final stage in the financial statement.
16	level-2	2	2	**DAS2210**	Inferential Statistics	20	200	The module is intended to impart the core of statistical inference starting from the theory of estimation to the statistical decision theory extended to the topics focusing on experimental design and Statistical Quality Control. Through the content of this module students acquire strong knowledge of application of statistical inference in the areas of Demography, Policy analysis, Agriculture, Medical and Market research, Production Process /Quality control.
17	level-3	3	1	**DAS3111**	Applied Demography and data analysis	20	200	This module will first focus on deepening the knowledge and skills of the students in the field of formal (statistical) demography giving insight mainly on recall the standardization, model life tables, methods on working with incomplete data, migration measurement, basic epidemiological models as well as aggregate fertility model. The second center of interest in this module will be the interrelation between economy and population by studying the influence of economic determinants on demographic behavior in general and in particular in African (Third World) countries, as well as looking at the economic consequences of population changes at various scale levels (national, regional, individual). This module will end by the third focus which will emphasis on health related problems in order to elaborate appropriate health programs.
18	level-3	3	1	**DAS3112**	Advanced Economics	15	150	Students should be able to explain the consumer theory, producer theory and market structure, construct and apply the IS-LM model in policy analysis, macroeconomic models and problems expressed in standard diagrammatic and basic mathematical terms, and be able to examine problems based on such models; use macroeconomic concepts and methods to analyze and interpret issues of macroeconomic policy and discuss the Macroeconomic Policy of Rwanda

19	level-3	3	1	**DAS3113**	Sampling and statistical soft wares	15	150	Sampling methods are used in developing countries to produce information for different fields: demographic surveys, socioeconomic surveys**.** For example studying household budget, or consumption, or agricultural surveys. The principle is to replace the whole by a part, the sample, which will be used to extrapolate to the whole. While using the method, some technical or organizational constraints must be considered jointly with the theoretical aspects. The object of this course is to present the theoretical principles in a simple manner, and to link them to the practical problems. At the end of the course the students will be able to find a sample in the framework of the study of a number of subjects for which it is impossible to investigate the unity body. Statistical soft wares been more familiarized by the students.
20	level-3	3	1	**DAS3114**	Systems Approach to Designing, Integration and projection of data frameworks	10	100	At the end of the course students would be aware of how different statistical data sets based on administrative data sources (e.g., tax systems, social security systems, government records, banking records and financial statements of enterprises) and surveys (economic surveys, household surveys, population census, agricultural census) could be organized and brought together in a macro accounts framework, with the aim of utilizing those data jointly in policy analysis. Thus, the course establishes the link between statistical data collection and analytical organization of data for use in policy analysis.
21	level-4	3	2	**DAS4215**	Research Methodology	10	100	This module aims to provide students of Applied Statistics with contemporary knowledge on research methodology especially in: (i) Application of scientific research methods and techniques in dealing with issues in Applied Statistics, (ii) The art of conceptualization of research problem, preparing the research design, collection & analysis of data and writing of research reports with a focus on problem oriented Applied Statistics research in Rwanda. This module, is also a prelude to the 'B. Sc research project' wherein the students expected to prepare the research proposal that will be used for the preparation of the dissertation, covers the following topics: meaning and importance of research, dealing with conceptual issues, review of literature, formulation of research design, collecting the data, data analysis and writing the research report
22	level-4	3	2	**DAS4216**	Macro Accounts for Inter-Disciplinary Analysis	10	100	This module aims at equipping students with skills to compile Satellite Accounts, to use data to generate Input-Output Table and Social Accounting Matrix, and to use Data System to analyze Policies.
23	level-4	3	2	**DAS4217**	Econometrics	20	200	Students in Applied Statistics are often interested in relationships between different variables, e.g. consumption and prices. The aim of econometrics is to quantify such relationships using available data and statistical techniques and to interpret and use the resulting outcomes. Thus, econometrics is the interaction between (economic) theory, data and statistical methods (e.g. estimation and testing). The interaction of these three fields makes econometrics interesting and a must for a dedicated student in Applied statistics.
24	level-4	3	2	**DAS4218**	Multivariate statistics	20	200	This Module is designed to give knowledge to students on the topics focusing on statistical analysis. The course focuses techniques of conducting statistical analysis of data involving more than two variables in order to draw appropriate and valid conclusions. The module also deepens the understanding of *inferential statistics*.
25	level-5	4	1	**DAS5119**	Practical Training Report (DURING November-December AT THE END OF YEAR - 3)	10	100	The module is intended to impart the basic knowledge in theory and practice by placing the students in organizations/ institutions that are relevant to the student's area of specialization. This 'work experience, (internship) module gives the students the opportunity to use the things he/she has learned in DAS-NUR and put it in practice. This way the student gets work experience in their field of study. The placement is for one month which is done after the completion of third year during November and December. They gain professional experience and provide services to the host community by working with corporate, governmental, public, or private organizations. It also aims to familiarize students to institutions in the country that are users and/or sources of statistical data, before getting involved in the final year dissertation research. The students are expected to learn how the organizations are working by making use of the theoretical knowledge that they have gained from the class room - the students are learning the 'practice' of the theories and models.
26	level-5	4	1	**DAS5120**	Uses of Data Systems in Policy Analysis	15	150	This module introduces several quantitative methods and illustrates their application using mathematica software. The application of least-squares estimation and Bayesian estimation methods is illustrated within the context of updating a SNA or a SAM, the application of RAS method to project the missing elements of a SAM or a IO table, and finally, the application of structural path analysis to calculate SAM path multipliers of alternative policies.

27	level-5	4	1	**DAS5121**	Statistical Ethics, Statistical organization & Field Research	15	150	This module aims to familiarize students to ethics and organization of statistics aspects (i.e., confidentiality of individual data, principles governing official statistics, type of statistical organization, statistical programmes). Further, the 'field research' component aimed at collecting primary (original or otherwise unavailable) data, it involves face-to-face interviewing, participant observation, data collection, and survey research. Field research is meant to collecting or creating new information outside of a laboratory/classroom or typical workplace. The advantages of field research are that students are closer to real world conditions and that they can design the research in the best way to discover the particular information required. Students can also be sure that the information gathered is up to date for which they are trained in planning surveys, preparation of questionnaires, data processing and analysis, and report writing.
28	level-5	4	1	**DAS5122**	Non-parametric methods	10	100	This module covers nonparametric statistical methods which are widely used for studying populations that take on a ranked order. It provides a sound foundation in the theory and practice for researchers
29	level-5	4	1	**DAS5223**	Economics of Development	10	100	Economic development and poverty reduction is the prime concern of Rwanda. This module makes the students aware of the policy imperatives and data requirements for the same from the theoretical as well as applied point of views.
30	level-5	4	2	**DAS5224**	GIS and Data Management	15	150	This module is to provide students with basic theoretical and practical knowledge of GIS technologies and skills to explore and analyse spatial data. This includes mastering the different concepts, tools and methods to capture, store, analyse and produce spatial data.
31	level-5	4	2	**DAS5225**	Operations research	15	150	The Operational Research or scientific management is a scientific approach for the resolution of the complex problems of management. It wants to be a powerful tool to the decision maker which helps him to make his decisions in a rational and systematic way. At the end of the course the student will be able of: (i) To point out certain techniques of operations research, being able to help the economist and the manager in the decision-making; (ii)To recognize, formulate the problems and to locate them in the good context for the decision-making. (iii) To optimize an objective or economic function subjected to a series of constraints, it is to find the best combination of **actions**, strategies or **activities** among a whole of alternatives.
32	level-5	4	2	**DAS5226**	Management of Development Projects	10	100	Students should be able to get a clear picture of the dimensions and aspects of development projects and will also be learning the data requirements for efficient management of development projects as well as how to analyze the data in the context of planning development projects in the country.
33	level-5	4	2	**DAS5227**	**Research Project**	20	200	The research project is meant for training students in conducting research with a intention to enhance: (i) Ability to carry out a defined research project, (ii) Ability to take personal responsibility for decision making, (iii) A systematic understanding of key aspects of their field of study, (iv)A critical understanding of the principal theories and concepts, (v) Evaluation and consolidation of knowledge, skills and thinking in a subject/ discipline, (vi) Use a range of methods and techniques including some that are specialized, advanced and/or at the forefront of the subject/discipline. At the end of the module the students will be familiarized with the current policy debates and policy making process relating to Rwandan development as well as linking policy research and policy making process and implementation.
						480	**4800**	