

# Bridging the gap between official statistics and theoretical statistics

Nelson Ndifwa<sup>a,\*</sup> and Kuldeep Kumar Saxena<sup>b</sup>

<sup>a</sup>*Eastern Africa Statistical Training Centre, Tanzania*

<sup>b</sup>*University of Dodoma, Dodoma, Tanzania*

**Abstract.** Generally, statistics means numerical data or quantitative information in an enquiry. In ancient times, statistics was used as ‘political arithmetic’. Some view it as branch of mathematics while others view statistics as information. Nobody is arguing on the importance of mathematics in studying statistics.

Official statistics are statistics published by the government and its agencies to make decisions about society and the economy while theoretical statistics is the application of mathematical knowledge in studying different statistical theories and methods. The importance of official statistics cannot be over-emphasized, but the graduates from many universities in developing countries, are equipped with theoretical statistics with almost no knowledge in official statistics. These graduates need to be first oriented with official statistics within National Statistics Offices (NSOs) to understand the skill, intricacies, and competencies to make sense of statistical information in areas of importance to society.

In addition, there is a need to identify gaps and various other aspects related to official statistics, which these graduates should learn, in order to be considered literate in official statistics.

This paper aims to address how to bridge the gap between official statistics and theoretical statistics to the statisticians, and hence to ensure that we leave no statistician behind because official statistics matter to all statisticians.

**Keywords:** Official statistics, theoretical statistics

## 1. Introduction

Statistics is a fast growing subject. As a discipline, it is as old as human civilization. From its origin, statistics has been used as a tool of analysis. In ancient times, the state was using Statistics to keep different administrative and economic records. These records relate to population, age and sex-wise distribution of population, birth rate, death rate, stock of wealth etc. This information (statistics) was of immense help to the state for its administration and policy formulations. Official statistics provide a picture of a country or different phenomena through data, and images such as graph and maps. Statistical information covers different subject areas (economic, demographic, social etc.).

It provides basic information for decision-making, evaluations and assessments at different levels. Offi-

cial statistics providers are interested in increasing the use of their information products through multiple user groups. It includes general public by taking many steps to improve the quality of their information services: they have been opening up free access to their information products through digital portals, and have been continuously seeking ways to improve levels of public trust and confidence in official statistics, as well as the level of satisfaction with their information products [3,4].

Different initiatives have been taken to improve both official statistics and statistics training in Africa, but these initiatives were focused on capacity building of National Statistics Offices (NSOs) and Statistical Training Centres (STCs) staff leaving behind graduates from many universities in Africa offering statistical programs. Some of the initiatives of improving statistics in Africa include: Global Strategy to Improve Agricultural and Rural Statistics; The African Group on Statistics Training and Human Resource Development (AGROST); Improving Household Surveys for Mea-

---

\*Corresponding author: Nelson Ndifwa, Eastern Africa Statistical Training Centre, Tanzania. E-mail: nelson.ndifwa@eastc.ac.tz.

asuring Poverty and Welfare; Cooperation Project for Capacity Building in Statistics; Strategy for the Harmonization of Statistics in Africa (SHASA).

At university level, the learning of research methods is spread over multiple degree levels (e.g., undergraduate, graduate, doctoral), and is organized in diverse ways across different academic institutions and departments. An STC is any post-secondary institution offering statistics and awarding certificates in statistics as the main subject with or without programs in related areas like Demography, Population studies, Actuarial Science, Operation Research, Computer science, etc. or programs in application of statistics in substantive fields e.g. Health, Population, Agriculture, Biology, Education, sociology, medicine, environment, etc. Yet, the STC may be used rather restrictively to refer to university faculty, college, school, department or unit, and institutes with affiliation to universities.

## 2. Review of some of the literature related to capacity building in statistics

This paper aimed to fill the existing gap between official statistics and theoretical statistics for the statisticians in Africa. Towards the end of the sixties, Africa witnessed the establishment of United Nations supported training institutions, which aimed at addressing Africa's human resources requirements in the field of statistics and population studies. The Statistical Training Programme in Africa (STPA), focused on African Population Programme and National Accounts Programme. For instance, the Institute of Statistics and Applied Economics (ISAE), at Makerere University, the East Africa Statistics Training Centre (EASTC) in Tanzania, the Regional Institute for Population Studies at the University of Ghana and the Population Studies Institute located in Egypt, are some of the regional training initiatives started then in Anglophone and Arab speaking Africa. Different initiatives of improving official statistics and statistical training in Africa (GSARS, AGROST, C4D2, SHaSA, etc.) include component of statistical capacity building. However the focus of these initiatives was to build capacity of staff working with National Statistical Systems (NSSs) and Statistical Training Centres (STCs). There is a gap among official statistics providers, statistics educators and non-specialists users of statistics and hence, this situation lead to statistical literacy related to official statistics [5].

There are very few studies in Africa associated with statistical training particularly statistics and offi-

cial statistics. Msokwa [1,2] looked at challenges and prospects for professional statistical training and statistical education in Tanzania; and the findings from the study revealed that academia view statistics as a very rich mathematical game while official statistician on the other end view statistics as information. In addition, the study revealed that one of the major challenges of statistical training in Tanzania was the lack of qualified lecturers while the prospect was increasing demand for statistics (data-results based management). Moreover, some researchers studied on the gap between producers and users of statistics, revealed that many initiatives of statistical advocacy focused on supply side, that is building capacity to producers of statistics in order to be able to produce quality and reliable statistics for the users without considering the use side [1,2].

A Committee was constituted at the 40<sup>th</sup> session of the International Statistical Institute to study the gap between various categories of statisticians. The President of the ISI had expressed concern about the growth of gaps between different categories of statisticians. They identified three principal categories of statisticians:

- The academic statistician (highly trained statistician in theoretical statistics);
- The statistical data specialists (people involved in a wide range of practical knowledge in the field); and
- The subject matter analyst (more diverse in the field assisting the practical statistician in conducting the survey).

The Committee asked a number of people to give information on national practices. The ISI report listed the three categories of initiatives currently in use to bridge the gaps;

- Education and training in theory and application in statistics;
- Institutional arrangements in government statistics offices, universities and businesses; and
- Activities of national and international statistical societies.

In the following, all the three are discussed in detail.

## 3. Education and Statistical Training in Tanzania

### 3.1. Education system in Tanzania

Tanzania is one of the countries in the East Africa region that got her independence in 1961 from British. Since then the education system of Tanzania has

changed significantly due to economic and political changes over time. The Ministry of Education, Science and Technology in Tanzania is responsible for coordinating education. The education system of Tanzania has mainly three levels known as Basic, Secondary and Tertiary education. The structure of education system in Tanzania constitutes two years for pre-primary education, seven years for primary education, four years for ordinary secondary education, two years for advanced secondary education and at least three years of tertiary education.

In Tanzania, there are three different authorities managing tertiary education; these authorities are Tanzania Commission for Universities (TCU), National Council for Technical Education (NACTE) and Vocational Educational and Training Authority (VETA). TCU is a corporate body, established on 1<sup>st</sup> July, 2005, under the Universities Act 2005 (Chapter 346 of the Laws of Tanzania). It has the mandate to recognize, approve, register and accredit Universities operating in Tanzania, and local or foreign University level programs being offered by registered higher education institutions and it also coordinates the proper functioning of all university institutions in Tanzania so as to foster a harmonized higher education system in the country. It has 43 registered and accredited universities to date ([www.tcu.go.tz](http://www.tcu.go.tz)).

The National Council for Technical Education (NACTE) is a corporate body established by the National Council for Technical Education Act, 1997 (Act No. 9 of 1997). The Act provides a legal framework for the Council to coordinate provision of technical education and training and establish an efficient national qualifications system that will ensure that products from technical institutions are of high quality and respond to changing needs as well as technological innovations in the world. It has 521 registered and accredited institutions to date ([www.nacte.go.tz](http://www.nacte.go.tz)).

The Vocational Education and Training Authority (VETA) is an autonomous Government Agency, established through the Act of Parliament No. 1 of 1994 Chapter 82 [Revised in 2006]. The overall objective of establishment of VETA is to oversee the Vocational Education and Training (VET) system in Tanzania in respect of promoting, coordinating, providing, regulating and financing VET in the Country. VETA provides training through 33 vocational training centers and institutes; and it coordinates more than 700 VET institutions owned by other VET providers in the country ([www.veta.go.tz](http://www.veta.go.tz)).

### 3.2. Statistical Training in Tanzania

The teaching of Statistics courses in Tanzania can be traced back from the establishment of the University of Dar es Salaam in 1961 as an affiliate College of the University of London. In 1963, after Tanzania (then Tanganyika) gained its independence, its affiliation was shifted to the University of East Africa. Earlier, Statistics courses were taught as part of mathematics faculty course before the department of statistics was established in 1967. In 1970, it gained the title of being an independent university in Tanganyika (Msokwa, 2018). In later years, with the establishment of other universities in the country, statistics courses were also introduced. Most of these courses were geared towards what we can call "Statistical Theory and Methods". They were more inclined towards mathematical Statistics. Only mathematically interested/talented students pursue them [1,2].

Students start studying statistics courses separately from mathematics at tertiary levels. It is at this level, where a student decides to take statistics courses as minors or majors for their first degree. The pre-requisite for a student to take statistics courses is that he/she should have studied mathematics at the advanced secondary school level.

### 3.3. Review of the bachelor of statistics programs in Tanzania

There are few higher learning institutions in Republic of Tanzania offering statistics program. They are as follows:

- University of Dar es Salaam (BA-Statistics, MA-Statistics and Ph.D-Statistics by thesis);
- University of Dodoma (B.Sc. Statistics, M.Sc.-Statistics and Ph.D-Statistics by thesis);
- Mzumbe University (Certificate of Applied Statistics, Diploma in Applied Statistics and Bachelor of Applied Statistics); and
- Eastern Africa Statistical Training Centre (Certificate of Statistics, Diploma in Statistics, Bachelor of Official Statistics, Masters of Official Statistics and Masters of Science in Agricultural Statistics).

Findings in Table 1 show the study structure of BA-Statistics at the University of Dar es Salaam. The courses of BA-Statistics focused on statistical theory and methods; and some courses on economics and other theoretical courses except any course related to official Statistics. Therefore, it can be concluded that the statistician graduated from the University of Dar es Salaam

Table 1  
Programme structure of BA – statistics at University of Dar es Salaam

Core	Optional	Core	Optional
<i>First year: Semester I</i>		<i>First year: Semester II</i>	
Basic Statistics	Introduction to Critical Thinking and Argumentation	Probability Theory I	Development Perspective II
Analytical Calculus	Principles of Accounting I	Time Series and Index Numbers	Principles of Accounting II
Communication Skills for Arts and Social Science	Introductory Microeconomic Analysis I	Operations Research I	Introductory Microeconomic Analysis II
Development Perspectives I	Introductory Macroeconomic Analysis	Linear Algebra with Application	Introductory Macroeconomics Analysis II
<i>Second year: Semester I</i>		<i>Second year: Semester II</i>	
Probability Distributions I	Intermediate Microeconomic Analysis I	Probability Distribution II	Probability Theory II
Statistical Inference I	Intermediate Macroeconomic Analysis I	Applied Statistics II	Intermediate Microeconomics Analysis II
Differential and Difference Equations	Introduction to Computers	Non-parametric Statistics	Intermediate Macroeconomic Analysis II
Basic Demography Models	Pan-African Thought and Practice I	Regression Analysis	Pan-African Thought and Practice II
<i>Third year: Semester I</i>		<i>Third year: Semester II</i>	
Statistical Inference II	Design & Analysis of Experiments	Multivariate Normal Distribution	Non-Linear Programming
Statistical Quality Control	Economic Policy Planning and Programming I	Stochastic Processes	Applied Econometrics
Statistical Methods of Econometrics	Applied Quantitative Methods	Sampling Theory & Methodology	Mathematical Demography
Applied Statistics I	Survival Models	Linear Models	
	Actuarial Modeling		

Source: 2019/2020 UDSM Prospectus.

Table 2  
Programme structure of B.Sc. Statistics at University of Dodoma

Core	Core
<i>First year: Semester I</i>	
Basic Statistics	Probability Theory
Mathematical Analysis I	Social and Economic Statistics
Linear Algebra and Applications	Mathematical Analysis II
Development Perspectives	Operations Research I
Communication Skills	Introduction to Programming Language
Introduction to ICT	Introduction to Macroeconomics
Introduction to Microeconomics	
<i>Second year: Semester I</i>	
Probability Distributions	Research Methods and Practice
Basic Demographic Models	Regression Analysis
Statistical Inference	Financial Statistics
Statistical Methods for Quality Control	Non Parametric Methods
Operations Research II	Time Series and Forecasting
Introduction to Mathematical Finance	Ordinary Differential Equation
	Practical Training
Optional – Actuarial Statistics and Database Management Systems	
<i>Third year: Semester I</i>	
Sampling Theory and Methods	Statistical Project
Design and Analysis of Experiments	Stochastic Processes
Multivariate Analysis	Biostatistics and Epidemiology
Statistical Methods for Econometrics	Management of Information Systems
Categorical Data Analysis	Economic Policy, Planning and Programming II
Economic Policy, Planning and Programming I	Entrepreneurships and Small Business
Optional – Applied Spatial Statistics and Project Monitoring and Evaluation	

Source: 2018/2019 UDOM Prospectus.

Table 3  
Programme structure of Bachelor of Applied Statistics at Mzumbe University

<i>First year: Semester I</i>	<i>First year: Semester II</i>
Elementary Statistics	Theories of Statistics I
Mathematics I	Mathematics II
Study Skills & Business Communication	Economics
Introduction to Information Technology and Applications	Databases and Database Systems
Introductory Accounting	Development Perspectives
<i>Second year: Semester I</i>	<i>Second year: Semester II</i>
Theories of Statistics II	National Income Accounting
Design of Experiments	Agricultural & Industrial Statistics
Sampling Theory and Survey Techniques	Operations Research
Non parametric Statistical Methods and Techniques	Statistical Methods of Econometrics
Time Series Econometrics and Index numbers	Research Methods
<i>Third year: Semester I</i>	<i>Third year: Semester II</i>
FIELD ATTACHMENT	Demography
	Multivariate Statistical Methods
	Biostatistics
	Actuarial Statistics
	Monitoring and Evaluation of program

Source: 2019/2020 MZUMBE Prospectus.

Table 4  
Programme structure of Bachelor of Official Statistics at Eastern Africa Statistical Training Centre (EASTC)

All courses are core

<i>First year: Semester I</i>		<i>First year: Semester II</i>	
Linear algebra	Micro-economics	Macro-economics	Basics of Population Statistics
Calculus	Basics of Statistics	Design of Experiment	Social-political Studies
Advanced Communication Skills	Personal Skills and Professional Development	Statistical Computing Packages	Continuous data Sampling Distributions
Statistical Inference	Real data Sampling Distributions	Database Design	Social Statistics
<i>Second year: Semester I</i>		<i>Second year: Semester II</i>	
Industrial Statistics	Labour Statistics	External and Distributive Trade Statistics	Actuarial Science and Financial Statistics
Multivariate data Analysis	Environment and Energy Statistics	Econometrics	Operation Research
Sampling Techniques and Survey Design	Non-Parametric Statistical Methods	Price Statistics	Population data Analysis
Measures of Population factors	Infrastructure Statistics	Agricultural Statistics	
<i>Third year: Semester I</i>		<i>Third year: Semester II</i>	
Research Methodology		Research Project	
Introductory National Accounts		National Accounts	
Policy and Planning for Development		Resource Management	
National Statistical Systems Development		Monitoring and Evaluation	

Source: Department of Official Statistics-EASTC.

has no knowledge related to official statistics. This is a big challenge for the National Statistical Office, like NBS in Tanzania to impart a specialized training to the newly recruited graduate having degree in Statistics.

Course structure of B.Sc.-Statistics at the University of Dodoma is presented in Table 2, which shows that the University of Dodoma, focused on statistical theory and methods; and some courses on economics and Bio-statistics and Actuarial Statistics courses, however the program includes one course related to Official Statistics (Social and Economic Statistics). Therefore, the statistician graduated from the University of Dodoma has little knowledge of official statistics.

Similar result was obtained from the program struc-

ture of Bachelor of Applied Statistics of Mzumbe University as indicates in Table 3. The program courses of Bachelor of Applied Statistics have many courses of statistical theory and methods; and few courses on economics and other cross-cutting courses. The program includes only two related courses of Official Statistics (Demography and Agricultural & Industrial Statistics). Therefore, the statistician graduated from the University of Mzumbe has some knowledge on official statistics.

The program structure of Bachelor of Official Statistics of the Eastern Africa Statistical Training Centre focused on both theoretical statistics and official statistics as depicted in Table 4. The program, includes number of courses related to official statistics such as: Ba-

sics of Population Statistics; Social Statistics; Industrial Statistics; Labour Statistics; External and Distributive Trade Statistics; Environment and Energy Statistics; Price Statistics; Population Data Analysis; Measures of Population Factors; Infrastructure Statistics; Agricultural Statistics; Introductory National Accounts; and National Accounts. This indicates that the statistician graduated from the Eastern Africa Statistical Training Centre has complete knowledge on official statistics.

#### 4. Institutional arrangements of statistics in Tanzania

National Statistical Offices (NSOs) in Africa are generally part of civil service under supervision of the ministry responsible for planning that make difficult for NSOs to promote their programs and obtain appropriate funding for the programs [7].

The National Bureau of Statistics of Tanzania is an autonomous public office under the Ministry of Finance and Planning [8]. NBS is responsible for production, coordinating, supervision, and dissemination of official statistics, and for the custodianship of official statistics in Tanzania. It has professional independence to collect, process, analyze and disseminate official statistics. The head of NBS is appointed by the President of United Republic of Tanzania on the recommendation of the Minister responsible for Statistics.

There is a National Statistical System (NSS) in Tanzania that is coordinated by the National Bureau of Statistics (NBS), which involves data providers, producers or user of statistics, research and training institutions. The NSS comprises a legal framework, institutional and organizational arrangements for collection, management and dissemination of official statistics. There is a general tendency to narrowly conceive the NSS as comprising data producers, leaving out altogether or paying cursory attention to other components and the inter-play among these components [7].

The National Bureau of Statistics normally involve all stakeholders of NSS when undertake research however the Bureau as other government statistical offices in Africa focused only on production of official statistics leaving out training to universities that lead to gap between theoretical training and applications.

#### 5. The review of some of the activities of national and international societies

##### 5.1. Statistical associations

Many countries have stressed the role of statistical

associations in integrating statistics and statisticians through dissemination of research results, organization of seminars, conferences and workshops, and providing expert advice on current problems of statistical practice [9].

Statistical Association in Tanzania is known as Tanzania Statistical Association (TASTA) with the vision of bringing inspiration of statistical data usage in decision making in all aspects of social and economic development. It has the mission of promoting the profession of statistics; promoting the practice and application of statistics; and bringing together statisticians in a professional way [10].

The statistical associations are expected to play a great role in bringing together all categories of statisticians, however many statistical associations in African countries including United of Republic Tanzania (URT) are weak and ineffective. TASTA among other statistical associations in Africa is normally organizing only workshop/seminar during World Statistics Day leaving out the role of bridging the gap between official statistics and theoretical statistics in the country.

##### 5.2. The International Statistical Institute (ISI)

International statistical associations are playing important roles in the development of statistics all over the world [7]. The international Statistical Institute is a professional association of statisticians established in 1885. The ISI mission is to lead, support and promote the understanding, development and good practice of statistics worldwide. It is a diverse and vibrant organization with a long history and a rich tradition.

According to its website, "The ISI is unmatched in its global reach among statisticians and those interested in the field of statistics. It also links with many international and national organizations, including national statistical societies with special focus on the societies in developing regions of the world". A majority of the world's central bureaus of statistics and many central banks are represented within the ISI network of institutional and corporate members. The ISI adopted *the ISI Declaration on Professional Ethics* with the aim to enable the statistician's individual ethical judgments and decisions to be informed by shared values and experience, rather than by rigid rules imposed by the profession. The declaration on professional ethics consists of a statement of shared professional values and a set of ethical principles that derived from these values.

The ISI plays a great role in building bridges between data producers and developers from different sectors

in society, being from business, academia, and official statistics. It leads an active programme for statistical capacity building, with workshops and seminars in the developing world. This programme is developed in co-operation with other partners such as World Bank and African Development Bank. The ISI contributes to the development of the statistical capacity in all countries, and especially less developed countries to meet the data demands for the Sustainable Development Goals (SDGs).

### 5.3. *The Royal Statistical Society (RSS)*

The Royal Statistical Society is one of the established International Statistical Societies. The vision of RSS is a “world where data are at the heart of understanding and decision- making”. Its mission includes the following

- Foster and encourage the growth, development and application of statistics in all areas of activity that can benefit from it;
- Establish, uphold and advance high standards of statistical competence;
- Foster the production and publication of statistics on aspects of a society;
- Serve the public interest by acting in an advisory, consultative or representative capacity in matters relating to the science of statistics and its application; and
- Promote the public understanding of statistics and the competent use and interpretation of statistics.

According to its website, The society was established in 1834 and is one of the world’s leading organizations advocating for the importance of statistics and data. It is a professional body for all statisticians and data analysts all over the world; and has more than 10,000 members in the UK and across the world. As a charity, the RSS advocates for the key role of statistics and data in society, and work to ensure that policy formulation and decision making are informed by evidence for the public good. There is a need to have a Tanzanian chapter of Royal Statistical Society for the benefit of statisticians in Tanzania.

### 5.4. *Global Strategy to Improve Agricultural and Rural Statistics*

The Global Strategy to Improve Agricultural and Rural Statistics (GSARS) was aimed to ensure the sustainability of agricultural and rural statistics in developing countries. It was a program implemented across five regions: Africa, Latin America and the Caribbean, Asia

and the Pacific, the Near East and the Commonwealth of Independent States. The global strategy was developed to fill the existing gap of lack of capacity of developing countries to provide reliable statistical data on food and agriculture for evidence-based decision-making and to provide a plan for sustainable agricultural statistical systems within countries.

The Global Strategy to Improve Agricultural and Rural Statistics was a comprehensive framework for improving the availability and use of agricultural and rural data in development countries and the GSARS had three pillars of namely: Produce a minimum set of core data; Better integrate agricultural into the National Statistical Systems (NSSs); and Improve governance and statistical capacity building. One of the pillars of GSARS was focused on statistical capacity of NSSs in Africa in order for the countries to produce agricultural and rural statistics and use these statistics to design more effective food security and agricultural and rural development policies.

### 5.5. *The African Group on Statistics Training and Human Resource Development (AGROST)*

The African Group on Statistics Training and Human Resource Development (AGROST) was established in 2009 to coordinate various initiatives on statistical training in Africa, advocates for strengthen statistical training and human resources development [11].

The main objective of AGROST is to coordinate statistical training and human resource development activities and initiatives in Africa by monitoring ongoing activities and initiatives, conducting project planning and aligning the support of technical and financial partners with statistical training. The specific objectives are to:

- Centralize information on initiatives and programmes on statistical training and ensure their monitoring
- Ensure the existence of a permanent forum for exchanging information and best practices on statistical training and human resource development in African national statistical systems
- The scope of the work of the Group includes initial training and continuous learning (on-the job training)

AGROST focused mainly in five areas namely: Trends of Statistical Training and Human Resources Development in Africa; Compendium of Statistical Training Centres (STCs) in Africa; Statistical Training Needs and Capacity Assessment; Review of the Statistical Training Curricula in Africa; and Harmoniza-

tion and Standardization of Statistical Curricula and qualifications. Among all, the most important is the construction of an harmonization and standardization strategy and development of an action plan to reconcile curricula across programs in a multi-program system across STCs and also with substantive field of statistical application and to align courses within the curriculum and ensure balance between areas of the subject namely theory, methods, applications and practice in theoretical statistics also.

### 5.6. Center for Data Development (C4D2)

The World Bank's Center for Development Data is a partnership among C4D2, the Bank of Italy, other Italian and Africa Institutions for capacity development in household surveys for welfare analysis. C4D2 is a Rome based hub for fostering methodological innovation and strengthening capacity in household surveys in low and middle income countries.

The partnership aims to:

- Improve the quality and coherence of international training on household surveys and other types of micro-data
- Enhance quality and sustainability in the design, implementation, and use of household surveys and other micro-data through greater dissemination of knowledge and best practices, and
- Mobilize financial, intellectual, and institutional resources including those of academia and research institutions to further support capacity development in these areas

C4D2 organizes Training of Trainers (TOT) courses for staff working with regional Statistical Training Centres (STCs), National Statistical Offices (NSOs), and National Statistical Systems (NSSs) in partner countries. Some of the short courses conducted by C4D2 include: Designing Household Surveys to Measure Poverty; Survey Solutions: – Geo-referencing and Integration into Household Surveys; Measuring Income and Wealth through Household Surveys for Welfare Monitoring; The Center for Development Data Training Initiative Internship Program; Measuring Consumption Through Household Surveys; and Advanced Sampling Techniques for Household Surveys.

### 5.7. Strategy for the Harmonization of Statistics in Africa (SHaSA)

In July 2009, the Assembly of Heads of State and Government of the African Union in Sirte, Libya, man-

dated the African Union Commission (AUC) in collaboration with the United Nations Economic Commission for Africa (ECA), the African Development Bank (AfDB) and members of the African Statistical System (ASS), to develop a Strategy for the Harmonization of Statistics in Africa (SHaSA). This was envisioned to support the African integration agenda and enhance coordination and collaboration with National Statistical Offices (NSOs), regional and continental statistical organizations, as well as development partners.

SHASA has four strategic themes and each theme has objectives.

#### *Theme 1: To Produce Quality Statistics for Africa*

Strategic Objective 1: To expand the statistical information base.

Strategic Objective 2: To transform existing statistics for comparability

Strategic Objective 3: To harmonize standards and methods of statistical production

#### *Theme 2: To Coordinate the Production of Quality Statistics for Africa*

Strategic Objective 1: To strengthen cooperation among institutions within the ASS

Strategic Objective 2: To establish an effective coordination mechanism

Strategic Objective 3: To define statistical priorities to implement the integration agenda

#### *Strategic Theme 3: To Build Sustainable Institutional Capacity in the African Statistical System*

Strategic Objective 1: To reform and enhance National Statistical Systems

Strategic Objective 2: To build sustainable statistical capacity

Strategic Objective 3: To establish an effective technological environment

#### *Strategic Theme 4: To Promote a Culture of Quality Decision-making*

Strategic Objective 1: To drive evidence-based decisions through the use of statistics

Strategic Objective 2: To improve communication of statistical information

### 5.8. The Italian Agency for Cooperation and Development (AICS): Cooperation project for capacity building in Statistics

Italian Agency for Cooperation and Development (AICS) in collaboration with EASTC implemented a

cooperation project for capacity building in Statistics from 2017 to 2018 at EASTC campus, Dar es Salaam Tanzania. The project involved the Department of Statistical Sciences at Sapienza University of Rome, and University of Padua, Italy.

The main objectives of the collaboration was to provide participants with

- wide review of the most advanced studies on gender equality at international level,
- with specific attention to methodological and technical aspects;
- introduce participants to the most advanced methodologies to design surveys and questionnaires;
- provide participants with wide knowledge to apply multivariate models on data collected, building up complex indicators and analyzing secondary data;
- and provide participants with knowledge on Economic Statistics (National accounts, Actuarial and Financial Statistics)

The short courses were conducted on the following topics:

- Population Analysis and Projection,
- Actuarial and Financial Statistics,
- Statistical Learning with Big Data,
- Methods in Impact Evaluation,
- Survey Methodology,
- Social Indicators, and Statistics for the Study of Gender Equality,
- Introduction to Missing Data Handling,
- Regression and Linear Multivariate Models,
- National Accounts and Economic Statistics, Sampling Methods and Data analysis with R.

## 6. Conclusion

In order to make informed decision in a country, official statisticians are high needed by the government, yet the study findings revealed that majority of the students joining statistics program at tertiary education in Tanzania graduates with theoretical statistics with little or no knowledge in official statistics. Other African countries face the same challenge therefore it is high time for theoretical statisticians to be imparted with Official Statistics (Social Statistics and Economic Statistics) knowledge; and the existing Statistical Training Centres in Africa can save the purpose.

## 7. Recommendations

1. There is a need to develop Postgraduate Diploma

(PGD) in Official Statistics (PGD in Social Statistics and PGD in Economic Statistics). This postgraduate diploma in official statistics will help theoretical statisticians to acquire fundamentals knowledge of official statistics. The existing STCs in Africa can teach the harmonized curricula of the proposed PGD.

2. There is also a need to establish postgraduate diploma for some specialized areas of official statistics like national accounts, national income and Agricultural & Rural Statistics for improving national accounts statistics and agricultural statistics for improving agricultural and rural statistics.
3. There is a need to establish a National Statistical Board in a country which should be made responsible to make sure that all graduates with statistics from universities become professional statisticians having sound knowledge of theoretical as well as official statistics. This body should be responsible among other things to coordinate matters related to setting professional examinations that will lead to chartered statistician qualification for some specialized areas of official statistics.

## Acknowledgments

Accomplishment of this work has been a result of co-operation and support from several people. The authors wish to thank everyone particularly; the referees for refinement of this paper. Special thanks go to Prof. Ben Kiregyera and Dr. Pieter Everaers for their constructive comments.

## References

- [1] Msokwa, Z.E. Challenges and prospects for professional statistical training and statistical education in Africa – Tanzanian experience. *International Journal of Education and Research*. 2014; 2(3).
- [2] Msokwa, Z.E. Statistics training for users and general public: a proposal. *International Journal of Contemporary Applied Sciences*. 2014; 1(4).
- [3] Biemer, P., Trewin, D., Bergdahl, H., Japac, L. A system for managing the quality of official statistics. *Journal of Official Statistics*. 2014; 30: 381–415. doi: 10.2478/jos-2014-0022.
- [4] Steenvoorden, T., Rvigelj, T.R., Bavdaz, M. Satisfaction with official statistics producers. *Statistical Journal of the IAOS*. 2015; 31(4): 645–654.
- [5] Gal, I., Ograjensek, I. Official statistics and statistics education: bridging the gap. *Journal of Official Statistics*. 2017; 33(1).
- [6] Msokwa, Z.E. Relevance of statistical theory and methods to Tanzanian prevailing socio-economic conditions. Paper presented in the conference on the topic “New Advances in Statistical Methods and their Applications” held in the university of Dodoma. 2018.

- [7] Kiregyera, B. The emerging Data Revolution in Africa Strengthening the Statistics and Decision-making Chain. Published by SUN MeDia Stellenbosch. 2015; 25–60.
- [8] United Republic of Tanzania. Statistic Act. CAP. 351. R.E 2019, 2019.
- [9] Duncan, J.W., Durbin, J. Report of the international statistical institute committee on the integration of statistics. International Statistical Review, Longman Group Limited/Printed in Great Britain. 1980; 48: 139–168.
- [10] TASTA. The Constitution of the Tanzania Statistical Association of 2018, 2018.
- [11] UNECA. African Group of Statistical Training. Harmonization and Standardization of Statistical Curricula and Qualifications. 2011.