

Impact of the Intra-Africa Metrology System (AFRIMETS) on Intra-African and Global Trade

Wynand Louw and Donald Masuku

Abstract: During 2007, the Intra-Africa Metrology System (AFRIMETS) was formed with the five sub-regional metrology organizations (SRMOs) in Africa as the principal members. Four countries not part of a SRMO also became members (Nigeria, Egypt, Ethiopia and Ghana), extending the countries represented in AFRIMETS to forty one. In October 2008, AFRIMETS officially became the regional metrology organization (RMO) representing Africa. The membership spans the continent with the important economic groupings represented through the SRMOs. SADC MET is the largest and most active SRMO. It plays a major role in harmonizing measurement to assist trade within the Southern African Development Community (SADC), the most economically active sub-region on the continent, and assists in the acceptance of its export products. EAMET, representing the East African Community (EAC), is fast expanding its activities and held several workshops and conferences during 2008 to advance metrology in the region. In the north MAGMET, representing the Maghreb countries, is pooling the measurement resources of Morocco, Tunisia and Algeria to support trade, especially with the European Union. Much work is needed to advance metrology (and trade) in the central and western parts of Africa. SOAMET, the secretariat for metrology of the Economic Community of West African States (UEMOA), became active during 2007/2008 and participates in AFRIMETS, but currently lacks the metrology infrastructure of SADC MET, EAMET and MAGMET. CEMAC MET, the metrology sub-region representing the Economic and Monetary Community of Central Africa (CEMAC), currently only exists in name and lacks a formal SRMO structure. During 2009, Egypt was instrumental in establishing a SRMO in North-Eastern Africa and including the two English speaking countries of Western Africa, Nigeria and Ghana. It is called NEWMET and it is expected that this new SRMO will play an important role in AFRIMETS from 2010 onwards. This paper explores the impact that SADC MET, EAMET and MAGMET have had on trade within the sub-regions and beyond the borders of Africa, and its potential future impacts. It also explores the potential for metrology to assist the expansion of trade from the central and western African sub-regions by highlighting how the lack of proper metrology infrastructure negatively impacts the potential for export.

1. Introduction

During 2005, a group of delegates from the Southern African Development Community Cooperation in Measurement Traceability (SADC MET), the National Metrology Institute of South Africa (NMISA), the Physikalisch-Technische Bundesanstalt (PTB), legal metrology at the National Regulator for Compulsory Specifications (NRCS), and the New Partnership for Africa's

Development (NEPAD) came together to discuss the formation of an umbrella body to further metrology in Africa, and the idea of an "intra-Africa metrology system" was borne. [1]

The first Intra-Africa Metrology System (AFRIMETS) workshop held in March 2006 [2] was attended by delegates from more than 25 African countries. A draft Memorandum of Understanding (MOU) was prepared and a second workshop was held in September 2006. The first General Assembly meeting was held in July 2007 at the premises of NEPAD at Midrand, South Africa. The MOU was finalized and signed by five SRMOs, namely (1) SADC MET, (2) East African Metrology Program (EAMET), (3) Economic and Monetary Community of Central Africa Metrology Cooperation (CEMAC MET), (4) Secretariat for Metrology of the Economic Community of West African States (SOAMET), and (5) Maghreb Metrology Cooperation

Wynand Louw

Donald Masuku

National Metrology Institute of South Africa (NMISA)
Private Bag X54, Lynnwood Ridge, Pretoria, 0040
South Africa
Email: wlouw@nmisa.org

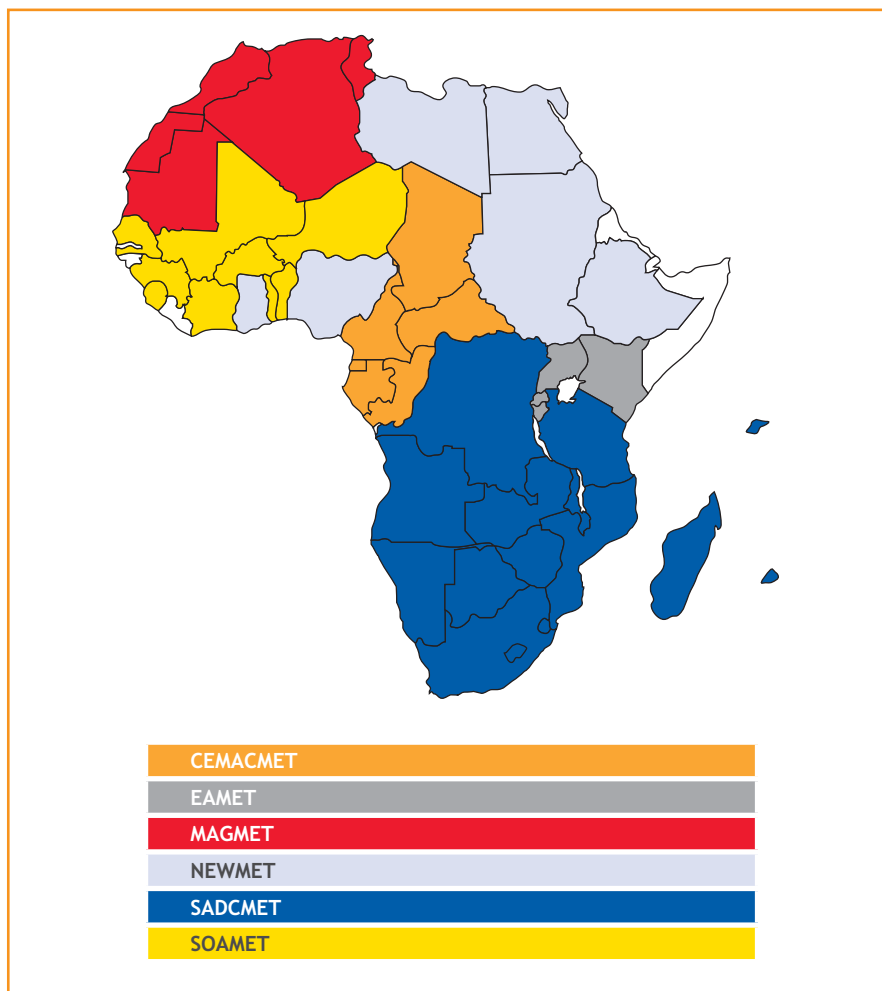


Figure 1. Map of the sub-regional metrology organizations of AFRIMETS.

SADCMET	SOAMET	CEMACMET	EAMET	MAGMET	NEWMET
<ul style="list-style-type: none"> • Angola • Botswana • Democratic Republic of Congo • Lesotho • Madagascar • Malawi • Mauritius • Mozambique • Namibia • Seychelles • South Africa • Swaziland • Tanzania • Zambia • Zimbabwe 	<ul style="list-style-type: none"> • Benin • Burkina Faso • Guinea Bissau • Mali • Niger • Senegal • Togo • Côte d'Ivoire 	<ul style="list-style-type: none"> • Cameroon • Central African Republic • Chad • Congo • Congo Brazzaville • Equatorial Guinea • Gabon • Sao Tome* 	<ul style="list-style-type: none"> • Kenya • Tanzania • Uganda • Rwanda • Burundi 	<ul style="list-style-type: none"> • Morocco • Algeria • Tunisia • Mauritania 	<ul style="list-style-type: none"> • Egypt • Nigeria • Ethiopia • Ghana • Libya • Sudan

Table 1. The individual SRMO members of AFRIMETS.
 * Sao Tome is a member of CEMAC; membership in CEMACMET is not yet confirmed.

(MAGMET), representing 37 countries in Southern, Eastern, Central, Western and North Western Africa. Four countries signed on as individual members. During

2009, Egypt united the four individual members, as well as Libya and Sudan, in a sixth sub-regional metrology organization in North-Eastern and Western Africa

(NEWMET). NEWMET officially joined AFRIMETS during July 2009. Mauritania then joined MAGMET, increasing the membership of AFRIMETS to its current number of 44 countries.

The primary aim of AFRIMETS is to harmonize scientific, industrial and legal metrology issues across Africa and to operate as a fully fledged RMO, fulfilling the obligations as stipulated in the Mutual Recognition Arrangement of the International Committee for Weights and Measures, the CIPM MRA. This leads to the secondary aim of fostering trade between African states and the rest of the world through the negation of technical barriers to trade.

Africa faces a huge challenge to stay abreast of technological developments, to be able to prove measurement equivalence and to provide analytical assurances for export products. Its economy is commodity based and relies heavily on metals, oil, diamonds and agricultural exports. As market access encompasses (i) intra-African trade, (ii) Africa's trade with other countries and regions, and (iii) the diversification of exports, the international linkages that AFRIMETS could provide to the analytical community is of inestimable value, and its impact on increasing trade could be huge.

The impact that the established sub-regional metrology organizations as members of AFRIMETS already had on intra-African and global trade, and the possible future impacts, are discussed in the following sections.

2. Structure and Members of AFRIMETS

AFRIMETS now spans the continent and consists of six sub-regional metrology organizations as principal members; the regional map is shown in Fig. 1. In addition, the country members of the SRMOs are shown in Table 1.

AFRIMETS thus covers the continent with the exception of a few countries on the eastern and western side of Africa that are without any mentionable metrology infrastructure. AFRIMETS is therefore ideally positioned to make an impact on intra-African and African global trade. Let us explore some success stories in the established SRMOs.

3. East Africa (EAMET)

The EAC Protocol on Standardization, Quality Assurance, Metrology and Testing (2001) has mandated the East African Standards Committee with the coordination of regional Standards, Quality, Accreditation and Metrology (SQAM) activities. Four technical sub-committees have been created. One of them is the Metrology Sub-Committee, which is responsible for coordinating metrological activities in the sub-region and assuring traceability to the International System of Units (SI). The chair and secretariat are held by one of the partner states on a rotational basis.

The Kenya Bureau of Standards (KEBS) is the driving force behind most of the metrology programs in the EAC, and undertakes activities such as managing the comparison measurements, hosting workshops and providing expertise in training and consultancy. The institute is well supported by the Kenyan government. In a speech at KEBS in March 2009, Dr. Kioko Mang'eli, the then managing director of KEBS, stated that [3]:

“A reputable and trustworthy standards and conformity assessment system is critical to Kenya’s economic transformation towards vision 2030 and on the whole towards Kenya’s international competitiveness. It is imperative in driving innovation and assisting international trade through meeting international standards by allowing regional and overseas markets to rely on Kenya standards. This facilitates the Government to achieve international obligations of protecting consumer health and safety as well as the environment without compromising standards. KEBS vision and mission for the country’s standardization and conformity assessment regime will thus create an enabling environment for the country to engage in the global trading system. The aspect of internationalization of standards has become more critical than ever before to trading processes and has become a leveling parameter in the trade arena. The two critical measures in this regard are internationally recognized levels of performance and safety.”

KEBS has made a substantial contribution to the increase in trade of Kenyan and other EAC products through the provision of internationally recognized measurement standards and accredited testing facilities. Although it is difficult to give specific examples, it is notable that the steady increase in intra-EAC, intra-African and global trade has occurred hand in hand with the development of the technical infrastructure in the region. One of the biggest increases in intra-regional trade was between Kenya and Uganda, where Kenyan exports to Uganda increased from \$400m to \$500m from 2006 to 2007, and imports from \$88m to \$118m. [4] The main contributor was the new liberal trade policies and a minimum of customs and immigration regulations between Kenya and Uganda. However, the close cooperation between KEBS and the Uganda National Bureau of Standards (UNBS) on metrology and standards provided the measurement base and harmonized standards to support the bi-lateral trade.

The Kenyan real growth rate in gross domestic product (GDP) was 6.4 % (est.) in 2006, 7 % in 2007, but slowed to 2.2 % in 2008. [5] Kenya’s economy is reliant upon a few primary goods including mainly coffee, tea and horticulture. [6] Kenya was actually not a good performer in agricultural exports over the past ten years [7], with the contribution to GDP declining by more than half, with the manufacturing sector and services showing the greatest gains in growth and trade. Notwithstanding, since 2004, Kenya’s tea production increased to the point where Kenya is currently the third largest producer and the single biggest exporter of tea in the world. [8] A big advantage is that Kenyan tea stems from a variety that is resistant to most pests and very little (or no) pesticides are used.

One concern is the quality of water used for both irrigation and processing, and accurate measurements are important for monitoring water quality. Kenya participates in the SADC MET water proficiency testing (PT) scheme. [9] Since its inception in 2004, the PT scheme has focused on chemical analysis of water covering all chemical parameters including sulfate, chloride, manganese, lead, copper, nitrates, etc. To date over 42 water testing laboratories have participated in the scheme, which ultimately contributes to ensuring that the water used in the region is within acceptable chemical limits; making it safe for human consumption (and suitable for the production of agricultural products, etc.).

The PT scheme has been so successful with a vast number of laboratories participating that the next PT round (started in July 2008) also includes microbiology analysis. Although indirectly, such projects support the primary trading of EAC goods.

A direct example of where the lack of a proper measurement system hampered trade was with the unilateral ban of Kenyan fish products by Spain from 1996 to 2004. It was based on allegations that Kenyan fish products contained *Salmonella*. Kenya had no capacity to contest the ban and it could be lifted only when Spain [10] decided to do this. If a proper measurement system had been in place in Kenya at that time it could have contested the ban more effectively.

In response to the ban on its fish products, the decline in agricultural exports and a greater awareness of food health issues (and following the successes of the water PT scheme project), KEBS established a Metrology in Chemistry section in 2007/2008. A regional metrology in chemistry conference was held in Nairobi in August 2008, with the focus on the provision of certified reference materials and the assignment of reference values to proficiency testing samples. Close collaboration has been established with the NMISA, and the first collaborative project on the value assignment has been on a wheat flour sample for an EAMET proficiency testing scheme.

It is too early to assess the full impact of metrology in chemistry on the Kenyan trade of agricultural products and processed foodstuffs, but the improvement in traceability and proficiency testing are already impacting on the ability of the testing laboratories to locally test products such as milk, wheat, coffee and tea, and to attain third party accreditation.

Tanzania has the largest agricultural contribution to the GDP of the EAC countries (41 % of GDP). Although a member of the EAC, Tanzania participates in SADC MET and its measure-

ment traceability needs are mostly catered for through this well established SRMO. A program to accredit 14 food testing laboratories is well underway and the first group of laboratories have already received third party accreditation to *ISO/IEC 17025*, "General Requirements for the Competence of Testing and Calibration Laboratories."

EAC trade liberalization has led to problems for countries such as Rwanda, where the local market was flooded by sub-standard and counterfeit products. [11] The response was that certain products were banned, for example plastic polyethylene bags, a particular brand of batteries, cosmetics containing hydroquinone, mercury and cortisones (except if being imported by a pharmacist) and all non-conforming products and counterfeits. This has placed an added responsibility on the Rwanda Bureau of Standards (RBS) [12] to provide metrology and testing for this purpose.

In summary, the expansion of the metrological capabilities in the EAC countries and the establishment of EAMET are making a positive contribution to intra-EAC and global trade. Many gaps still exist and the region needs to further expand its metrology infrastructure especially in metrology for chemistry, to fully support trade in foodstuffs, environmental monitoring and manufacturing.

4. Southern Africa (SADCMET)

SADC was formed in 1992. [13] It currently has fifteen member states, which are: Angola, Botswana, Democratic Republic of Congo, Lesotho, Madagascar, Malawi, Mauritius, Mozambique, Namibia, South Africa, Swaziland, Tanzania, Zambia, the Seychelles and Zimbabwe. The objectives of SADC include achieving active development and economic growth; alleviating poverty; enhancing the standard and quality of life of the people of Southern Africa; amongst others. SADCMET was formed at the same time as SADC, as part of the quality infrastructure. The formation of this cooperation coincided with the formation of several other regional bodies within SADCMET, specifically the technical committee and working group structures. [14]

The SADC SQAM program was established to progressively eliminate technical barriers to trade (TBTs) in the region, as well as between SADC and other regions in the world. This program is overseen by the SADC Directorate Trade, Finance, Industry and Investment. The SADC quality infrastructure includes several formal entities, established to perform specific functions of the SQAM program, of which SADCMET is one. The others are the SADC Cooperation in Legal Metrology (SADCMEL), the SADC Cooperation in Accreditation (SADCA), and the SADC Standardization Cooperation (SADCSTAN).

The NMISA is the most prominent NMI in the region. [15] It has 21 laboratories performing measurements in all the physical parameters (such as length, time, pressure, volume, and mass), electrical quantities (such as voltage, resistance and current), optical radiation, ionizing radiation, temperature, and many more. Metrology in chemistry is also well established with laboratories for gas metrology, surface analysis, inorganic analysis and, most recently, organic analysis and bio-analysis.

Intra-SADC, intra-African and African global trade are well established, with South Africa leading the way. Exports by most

countries focus on agricultural goods and commodities, with South Africa also exporting manufactured goods and services.

SADC launched a free trade area in August 2008, rooted in the classical economic principle of comparative advantage. The crude argument is that Member states will produce for export only those goods for which they have a comparative advantage while importing from regional neighbors goods that they cannot produce themselves. The advantage for industrialists is that they benefit from economies of scale as they produce for a bigger regional as opposed to a national market. [16] This also paves the way for entry into the more competitive global market.

While growing, intra-SADC trade is still low at around 25 % of total SADC trade and is concentrated in the Southern African Customs Union (SACU) region. [13] Most international trade is still taking place under bilateral agreements among fellow SADC member states or with former colonial powers with limited utilization of the Trade Protocol.

South Africa, as the most advanced economy in the region, has various international trade agreements, for example the Trade Development and Cooperation Agreement (TDCA) which is valid until 2012. Several trade agreements are being negotiated between the region (or parts of it) and other economies of scale, for example the "Interim Economic Partnership Agreement" (EPA), being negotiated between the European Union (EU) and Botswana, Lesotho, Namibia and Swaziland (the BLNS countries) plus Angola and Mozambique.

South Africa's economy is still largely reliant on the export of primary and intermediate commodities to industrialized countries. However, manufactured goods account for about 70 % of exports to Africa. Net gold exports are responsible for a large part of foreign exchange earnings. Earnings from this source, however, fluctuate with the shifting international gold price. Imports mainly consist of capital goods, raw materials, semi-manufactured goods and consumer commodities. [17] South African merchandise export increased by an average of 13 % per year from 2000 to 2006, with a 20 % increase in 2007. Agricultural products accounted for 8 % of the exports, fuels and mining products for 37 %, and manufacturing for 54 %. [18]

The metrology structures in SADC closely follow the intra-African and global trade patterns. Those countries with limited global, but increasing intra-regional trade, focus on basic metrology parameters such as mass, volume and temperature (for example Swaziland, Zambia and Namibia). Those participating in global trade established more advanced metrology and technical infrastructure (such as Botswana, Tanzania and South Africa) and are expanding into metrology in chemistry.

It is therefore no coincidence that the growth in exports during the past decade coincided with the expansion of the NMISA and the establishment and expansion of metrology institutes in countries such as Tanzania, Botswana and Mozambique. It cannot be claimed that the increase is directly related to the provision of metrology services, as the growth in exports stimulates increased investment in metrology infrastructure, but it can be claimed that the merchandise export is strongly supported by the metrology (and other technical) infrastructure as an important prerequisite for the acceptance of local produce and goods internationally and the acceptance of regional

imports for safety and consumption. Likewise, it would be foolish to claim that trade can not occur if the metrology or technical infrastructure is not in place. What can be claimed is that when the infrastructure is in place, it contributes to competitiveness through increased quality and comparability of products, the improvement in the monitoring of toxic or carcinogenic substances in agricultural products (especially food-stuffs), and, finally, by improving the global acceptance of manufactured goods.

Let us therefore compare the situation in South Africa which has a well established metrology infrastructure, with that of a country with limited (Swaziland) or no (Lesotho) metrological infrastructure.

In South Africa, a well established mechanical metrology section at the NMISA underpins dimensional measurement (through accredited calibration laboratories) in automotive component manufacture to the point where little or no "outside" measurement traceability is needed. Traceability for temperature, energy, radioactivity, irradiation and lighting measurements are provided by the electromagnetic section. An expanding metrology in chemistry section increasingly provides traceability for environmental monitoring (gas, inorganic and organic analysis), for alcohol in blood measurements (law enforcement), and for specialized research and manufacturing, such as aerospace and nanotechnology. Products can therefore be tested by accredited laboratories in South Africa, thereby minimizing the time to market and minimizing the rejection of products at the point of import.

Swaziland is an exporter of soft drink concentrate, wood pulp and sugar (mostly to South Africa). Before these products are accepted, they must be tested in South Africa, leading to delays. In addition, the export of meat is on the increase and again the acceptance of meat products by South Africa and other neighboring countries is subject to testing by South African laboratories, leading to delays in shipment, or the rejection of products at the final destination. Swaziland is now in the process of establishing basic metrological and testing facilities to alleviate the problem.

No testing facilities (whose results are regionally and internationally acceptable) exist in Lesotho. All fresh produce and manufacture must be tested in South Africa or overseas, and thus trade is hampered by a lack of basic measurement infrastructure. The establishment of basic metrology facilities in Lesotho is currently being investigated as part of a SADC-EU project aimed at the strengthening of the technical infrastructure in SADC. As no metrology infrastructure (neither buildings nor personnel) currently exist, the authors are of the opinion that an alternative option is to facilitate the testing of products from Lesotho in South Africa, rather than to establish capabilities from scratch.

In summary, the technical infrastructure in SADC (and specifically South Africa) is being held up as a role model for the other sub-regions in Africa. If similar capabilities could be established in the regions such as SOAMET and CEMACMET, 90 % of measurement needs could be met locally, with a positive effect on intra-regional and international trade.

5. North West Africa - Maghreb (Al-Maghreb Al-Arabi)

المغرب العربي

Maghreb, also rendered *Maghrib* (or rarely *Moghreb*), means "place of sunset" or "western" in Arabic. It is generally applied to all of Morocco, Algeria, and Tunisia; but in older Arabic usage, it pertained only to the area of the three countries between the high ranges of the Atlas Mountains and the Mediterranean Sea. The Arab states of North Africa established the Arab Maghreb Union (AMU) in 1989 to promote cooperation and economic integration. Its members are Morocco, Algeria, Tunisia, Libya and Mauritania. [19]

Informal technical regional cooperation in the Maghreb region has existed between the neighbors Algeria, Morocco and Tunisia since 2003. Regional training, sensitization of stakeholders to metrology issues and a first comparison in mass are the main components of this regional cooperation. The cooperation in metrology has been dubbed "MAGMET," and it then only referred to these three countries within the Maghreb region.

The economy of Algeria is mostly reliant on petroleum and natural gas, whilst Morocco and Tunisia rely on Atlantic fisheries, fruit and vegetables. Due to a relatively large and well trained working force, nearly 50 % of exports from these two countries are intermediate and finished manufacture. The destination is mostly the EU region, with the USA second. Established metrology infrastructure, especially in Morocco, already supports international export, and a basic measurement infrastructure is currently being established in Tunisia.

Intra-regional conflict, a clamp down on terrorism and rigid economic structures resulted in the Maghreb countries having one of the lowest rates of intra-regional trade in the world. [20] This is also borne out in the low growth rate (about 2.5 % in the period 2000-2005). This is where MAGMET can play an important role in the harmonization of measurements and standards to foster intra-regional trade, but the next five years will show if this sub-regional metrology organization can fulfill its promise. Mauritania joined MAGMET in June 2009.

6. SOAMET and CEMACMET

SOAMET is the sub-regional metrology grouping of the UEMOA countries namely Benin, Burkina Faso, Côte d'Ivoire, Mali, Niger, Senegal and Togo. UEMOA countries account for only 0.1 % of global trade in manufactured goods, and intra-trade is only 6 % of total trade. The main exports of the UEMOA countries are agro-food products, fish products and cotton. The main export market is the EU. [20]

In September 2001, to enhance the participation of the UEMOA countries in regional and international trade, the EU, United Nations Industrial Development Organization (UNIDO) and UEMOA launched a Quality Program as part of the UNIDO Trade Capacity Building Initiative. The Program is assisting with establishment and / or strengthening of institutional and human capacities in laboratory accreditation; the development of product and material testing laboratories (chemical, microbiology, etc.) according to international standards; standards formulation, adoption and dissemination; the development and implementation of quality policies; instituting quality awards; and

the development of consumer protection laws and associations.

Initially the focus of the Program was on food processing but in early 2003 the focus was extended to include fish. In September 2003, the focus was further extended to cotton. [22] The EU - UNIDO - UEMOA program design is based on the understanding that globalization and trade liberalization do not offer much to the developing world, especially the least developed countries (LDCs), unless they have competitive exportable products. Having competitive exportable products means not only having up to date information on developed country standards and the capacity to produce at those standards, which is a big enough challenge for any developing country, but it also means having the ability to prove that the products meet those standards. For cost reasons, this proof has to be provided locally. As inconvenient and costly as this requirement might be, it is of course very important that local industries are able to access reliable testing and calibration services. The Quality program therefore establishes quality and conformance assessment infrastructure and accredited laboratories. A regional accreditation secretariat *Système Ouest Africain d'Accréditation (SOAC)* was also set up with the technical support of the French Accreditation Body *COFRAC*. The activities have already rendered results with test methods for food products harmonized in 50 laboratories, and 14 laboratories accredited to *ISO 17025*.

Fifteen million people work in the cotton sector in Africa, of which ten million are in the UEMOA zone (six million in rural areas). UEMOA countries account for some 800,000 tons or 4 % of the world annual cotton production. In Benin, Mali, Burkina Faso and Togo, cotton fibre export represents between 5 % to 9 % of GDP and between 30 % to 75 % of export earnings. In 2000 less than 5 % of UEMOA raw cotton was processed, compared to 100 % in Turkey, Pakistan and China. Most of the 40 or so enterprises in the UEMOA cotton sector are organized in an "integrated" manner, whereby state enterprises provide farmers with seeds, credits and extension services. The state enterprises buy and gin the crops and market the cotton abroad. Currently most UEMOA cotton is tested manually on only two to three parameters, whereas state of the art testing is on seven parameters (only Burkina Faso and Benin have this technology). Weak capacity in measurement of cotton fibre in the UEMOA zone results in a decrease in price of around 5 %. [22]

An outstanding issue was metrology, and it is in the light of the above importance of accurate measurement (and traceability necessary for the accreditation of testing facilities) that in phase II of the Program, *SOAMET* was formed in 2007 to coordinate metrology activities in the region and assure traceability to the SI. It is still early, and although the political will is there and the basic structure of the secretariat is in place, it could be a while before *SOAMET* can operate at the level of *EAMET* and *SADCMET* and organize technical regional activities. *AFRIMETS* renders assistance to *SOAMET* (at least in advice and encouragement) and in 2010, a UNIDO project for assistance to *AFRIMETS* envisages the strengthening of the sub-regional metrology organizations.

CEMAC (from its name in French, *Communauté Économique et Monétaire de l'Afrique Centrale*) is an organization of states

of Central Africa established to promote economic integration among countries that share a common currency, the CFA franc. *CEMAC* is the successor of the Customs and Economic Union of Central Africa (*UDEAC*), which it completely superseded in June 1999 (through an agreement from 1994). Its member states are Cameroon, the Central African Republic, Chad, the Republic of the Congo (Brazzaville), Equatorial Guinea, Gabon and Sao Tome. The region shares a high dependence on oil and forestry, volatile economic growth, weak intra-regional linkages and a lack of transportation infrastructure. The zone is dominated by Cameroon and Gabon whose economies account for more than two-thirds of the region's GDP. The main export products are oil, diamonds and cotton.

CEMAC's objectives are the promotion of trade, the institution of a genuine common market, and greater solidarity among peoples and towards under-privileged countries and regions. Currently *CEMAC* countries share a common financial, regulatory, and legal structure, and maintain a common external tariff on imports from non-*CEMAC* countries. In theory, tariffs have been eliminated on trade within *CEMAC*, but full implementation of this has been delayed [4] and trade is hampered by a large number of policies not harmonized in the region. Traditionally, the *CEMAC* markets have been sheltered from competition with high tariff and non-tariff barriers in all sectors other than unprocessed raw material. [23]

CEMAC's intra-regional trade is relatively low (an estimated 3 % of total trade), and trade between France and *CEMAC* is more than 10 times the intra-regional trade. In all the sub-regions of Africa, the greatest gain could arguably be realized with an investment in the *SQAM* and especially metrology infrastructure in this region. The principle applies that if you start from a very small base, a relatively small investment can make a big difference. The flip side is that as very little infrastructure exists, it is difficult to start an activity. The *PTB* [24] and donor agencies such as *UNIDO* are active in programs to establish *SQAM* infrastructure in the region, but progress is slow. New activities are being started at the moment and the authors are confident that some gains will be realized in the near future.

7. Summary

This paper gives a short overview of the status of SRMOs in the sub-regions of Africa, the tangible positive effects metrology has had on trade in the case of *EAMET* and *SADCMET/SADCMEL*, and the possible future positive effect that metrology may have on intra-regional, inter-regional and African global trade in the less developed regions of Africa. With the positive role that *AFRIMETS* can play in enhancing metrology in the region, we may all look to a future with a continentally well established, harmonized and internationally recognized measurement community, supporting and fostering global trade to the benefit of the African continent and the world.

8. Abbreviations

<i>AFRIMETS</i>	Intra-Africa Metrology System
<i>AMU</i>	Arab Maghreb Union
<i>CEMAC</i>	Economic and Monetary Community of Central Africa

CEMACMET	CEMAC Metrology Cooperation
CIPM MRA	International Committee of Weights and Measures Mutual Recognition Arrangement
EAC	East African Community
EAMET	EAC Metrology Program
EPA	Interim Economic Partnership Agreement
EU	European Union
GDP	Gross Domestic Product
KEBS	Kenya Bureau of Standards
LDCs	Least Developed Countries
MAGMET	Maghreb Metrology Cooperation
NEPAD	New Partnership for Africa's Development
NEWMET	North-Eastern and Western Africa Metrology Program
NMISA	National Metrology Institute of South Africa
NRCS	National Regulator for Compulsory Specifications
PT	Proficiency Testing
PTB	Physikalisch-Technische Bundesanstalt
RBS	Rwanda Bureau of Standards
RMO	Regional Metrology Organization
SACU	Southern African Customs Union
SADC	Southern African Development Community
SADCA	SADC Cooperation in Accreditation
SADCMEL	SADC Cooperation in Legal Metrology
SADCMET	SADC Cooperation in Measurement Traceability
SADCSTAN	SADC Standardization Cooperation
SI	International System of Units
SOAC	Système Ouest Africain d'Accréditation
SOAMET	Secretariat for Metrology of the Economic Community of West African States
SQAM	Standards, Quality, Accreditation and Metrology
SRMO	Sub-regional Metrology Organization
TBTs	Technical Barriers to Trade
TDCA	Trade Development and Cooperation Agreement
UDEAC	Customs and Economic Union of Central Africa
UEMOA	Economic Community of West African States
UNBS	Uganda National Bureau of Standards
UNIDO	United Nations Industrial Development Organization
USA	United States of America

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