UNITED NATIONS COMMISSION ON SCIENCE AND TECHNOLOGY FOR DEVELOPMENT (CSTD)

Contribution to the CSTD ten-year review of the implementation of WSIS outcomes

Submitted by

CSTD GENDER ADVISORY BOARD

United Nations Commission on Science and Technology for Development (CSTD)

Questionnaire for CSTD's 10-year review of WSIS implementation

The same questionnaire is available online: http://unctad.org/en/Pages/CSTD/WSIS-10yearReview.aspx

Please share your experience, views and priorities in response to the following questions, addressing the issues that you consider most important for the CSTD' s ten-year WSIS review. Issues that you might consider could include any or more of the following, but need not be confined to these:

- infrastructure, access and inclusiveness;
- content, applications and capacity-building;
- technical, financial and related issues;
- governance and wider public policy aspects of the Information Society;
- social, economic and other development activities and impacts;
- the implications of new trends in technology and services;
- measurement and monitoring of the Information Society; and
- the relationship between the Information Society, sustainable development and the Post-2015 Development Agenda**.**

This submission deals primarily with gendered trends in access to ICT and mobiles; education in engineering and technology, and IT/technology workforce participation. It is based on input from Gender Advisory Board members, as well as the project on National Assessments on Gender and STI[1] managed by Women in Global Science and Technology (WISAT) in collaboration with the Organization for Women in Science for the Developing World (OWSD).

1. To what extent, in your experience, has the "people-centred, inclusive and development-oriented Information Society", envisaged in the opening paragraph of the WSIS Geneva Declaration of Principles, developed in the ten years since WSIS?

Argentina: The national ICT system is organized in several institutions that coordinate, organize and promote STI research and activities of a range of public organisms dedicated to a range of issues from agriculture (INTA) and industry (INTI) to science and technology. Gender issues are not formally considered.

Brazil: The country has broadly expanded the Information Society, in terms of numbers of citizens with access to ICT, expanded e-governance and a strong knowledge-based economy.

In terms of gender issues, the Special Secretariat for Women's Policies was initiated in 2003. It has ministerial status and has been very active, with an extensive web portal (http://www.sepm.gov.br/) with information and

[1] The project on National Assessments in Gender and STI is supported by the Elsevier Foundation and Sida.

data on women as part of an Observatory on women's issues (http://www.observatoriodegenero.gov.br/). It has developed many programs focusing on specific themes and concerns, with science and technology as one of its priority areas (Abreu, 2011).

Egypt has done a lot in developing ICT infrastructure during the last 10 years and also in capacity building. Egypt put new strategy in 2013 that focuses on three key objectives: the transformation of Egypt into a digital Society, the development of the ICT industry and the establishment of Egypt as a global digital hub. The political and economic changes is slowing down the implementation of the strategy.

India: The Science Policy of India (2007-2012) specifically states that it will promote the empowerment of women in all science and technology activities and ensure their full and equal participation. The 11th five year plan of S&T clearly spells out specific intervention areas which will help women in science and science for women.

The recommendations are divided into three categories as follows. Special provisions and programmes to encourage study and practice of science and engineering by women which has components of residential science schools in rural areas and counseling them to take on career opportunities in science; establishments of women universities which should offer SET courses; preference given to lady faculty members; re-entry options who had a break in career. The second major area is steps to reduce the stress on women scientists and students and facilitate study and practice of science by Women, flexible options, crèche and age relaxation, freedom of spouses to work in the same institution, inclusion of women on selection boards. The third area proposal for special schemes for women scientists to aid their re-location which may be needed when they get married (Nair, 20.

Some states have established policies and programmes to promote e-literacy for women and an inclusive information society such as the Natil e-governance plan for IT-literacy for women and the Common Service Centre Scheme to establish computer service centres across the country.

Indonesia: A series of knowledge centers have been established across the country to promote literacy, community skills, life skills, updated education skills and early childhood education. These are coordinated by : the Ministry of National Education, the Ministry of Religious Affairs (MoRA), the Coordinating Ministry for Social Welfare (Menko Kesra) and the Ministry of Manpower and Transmigration (MMT).

Republic of Korea: The country has implemented information technology and educational support for development of an information society since the early 2000s, with national information technology programmes, including one targeted at housewives.

2. How far do you consider the implementation of specific WSIS outcomes to have been achieved?

Argentina: The 2010 census of computer use in the household found that 77% of females use a computer in their household, making up and constitute 49.6% of Total Percentage of household computer ownership.

89% of females and 90% of males have access to and regularly use mobile phones (2010).

Brazil: Internet use has seen significant growth in the last decade. According to F/Nazca, 81.3 million Brazilians (12 years+) used the Internet2, while IBOPE/Nielsen tracked 78 million (16 years+ in September 2010). Fecomércio-RJ/Ipsos states that the percentage of Brazilians using the Internet increased from 27% to 48% between 2007 and 2011. Brazilians still use mainly public access (Lan houses) (31%), while 27% do so from their home and 25% from homes of relatives or friends.

Also, by the end of 2010, 93% of households of class A had a computer, while 76% of class B and almost 40% of class C also had a computer at home in 2010.

A higher proportion of women than men used the internet in 2010, a result of high use among young women. Men make up a larger share after 40 years of age. Women between 10 and 24 represented between 50 to 60% of Internet users in 2008. From the age of 24 their participation is lower than that of men, especially in the higher age brackets where they fall to about 9% of users (50 years+).[3]

Between 2005 and 2010, the % of males who have used a computer increased from 47% to 59%, and for women the increase was from 44% to 58%.

Cell phone use is also increasing. According to ANATEL, there were 236 million cell phones in Brazil by the end of 2011, with a density of 120.81 cell phones per 100 habitants. Of those, 81.5% used prepaid calling, which shows the predominance of the mobile in lower income groups.

Egypt: Some outcomes have been pushed back by at least one year. Initially it was estimated 75% of households having access to 2-Mbps broadband and about 98% of the population to have coverage by mobile 3G networks by 2015. Also the shortage of energy supply is affecting the internet service in the country.

I**ndia**: The Global Information Technology Report 2010-2011 gives a rank of 48 in the Network Readiness Index. Indian has the fastest growing telecom network in the world with its high population and development potential. The overall tele-density has increased to 73.97% as of June 30 2011 and the mobile tele-density has increased to 71.11% in June 2011.

While trends are available for the growth of the sector as part of national surveys, sex disaggregated data is not available. In 2000 23% of internet users where women .the total women internet users were 115000 of the 500000 total users of which 20.5% where female professional and tech workers. From a few reports the following data was found: 225 million women own mobiles, 60 million use internet, 50 million landlines. **S**tatistics on Internet usage considering age group and gender is as follows: 2/3rd households have 'multiple' users in them; 97% are regular users and 79% use daily; 70% of people who know computer have used Internet; 19-40 years age group constitutes nearly 85% among Internet users; 85% of Internet users are male; 11% of working women, 6% non-working women and 2% housewives use Internet which is not a very good sign and 46% of net users are graduate, 26% are post-graduate. A survey by Internet and Mobile Association of Indian (2011) pegs the internet users of working women (women in the age group of 21-58 years and employed outside home) at 7% and those of non-working women (women in the age group of 25-38 years of age and not working), this segment includes housewives as well as non-working young women who are not school or college going students, at 8%.

Indonesia: Sex disaggregated data on using internet and cell phones in Indonesia are not collected regularly. Data on certain years show that women constitute only 20–30 percent of internet users in Indonesia.

---

[2] *http://tobeguarany.com/internet_no_brasil.php*
[3] Dieese. Anuário 2011 Tabela 104

The National Socio-economic Survey (2007) compiled data on household access to information technology. It found that men have higher levels of access to telephone and cell phone (40 per cent) compared with women heads of household (32.9 per cent).

Mexico: 9 million households are equipped with a computer – 30% of the total households in the country, a 6.9% increase from 2010. Computer availability shows slight differences between households headed by men (29.9%) and those by a woman (28%). This behavior is similar in the case of internet access with 21.6% for male-headed households and 20.4% for female's. Men have a 50.5% rate of computer use, with women at 49.5%. As for the Internet, women represent 49.6% and men 50.4% of users. The age of Internet users fluctuates between 12 and 44 year, with youngsters between the ages of 12 and 17 using Internet services the most.

Republic of Korea: There has been dramatic growth in the number of mobile phone users, on the part of both men (88.5%) and women (85.2%) by 2010 as compared to 2005. The percentage of women who are mobile phone users has expanded especially rapidly: from 7.8% to 3.2% over the same five-year period. In a survey of people using smartphones, there were more female smartphone subscribers (52.9%) than men during the last six months. As of 2010, 72.4% of women and 83.2% of men used the Internet, attesting to the fact that gender disparity still persists in the Internet users. In 2001, Internet use rate of women increased to 44.6% and that of men to 58.7%.

The difference in Internet use rate by gender was 14.1% in 2001, which had decreased by 10.8% in 2010. The 2011 report by LG Uplus (a Korean wireless company) on the usage pattern of subscribers to the multimedia wifi service shows that men were faster to accept and adopt a high-end mobile phone than women (men 69%, women 31%). Regarding age, the users in their 20s were 50% greater than those in their 30s in women, whereas, in men, the proportion for users in their 30s was 10% higher than that those in their 20s.

South Africa: Women have greater access to cell phones than men (65% versus 58%). However, in terms of internet use the trend is reversed as only 11.3% of women use the internet compared to 20.4% of men. In the case of South Africa, men and women both had access to the Internet largely through their place of work, though a few had access at home, with business people also having mobile access either on their mobile phones or laptops. In the case of the urban, mixed gender focus group, the business person with these multiple access points was a man (Gillwald, Milek & Stork, 2010).

3. How has the implementation of WSIS outcomes contributed towards the development of a "people-centred, inclusive and development-oriented Information Society"?

Brazil: Qualitative studies refer to the importance of cell phones for the self-employed and for daily workers, and this is also true for women. Domestic workers working on a daily basis, self-employed street vendors, or those working in services related to beauty sector such as manicurists and hair stylists, all profit from owning a cell phone and being able to reach or be reached by clients.

Use of Internet and Internet skills are increasing among females. Men and women have experienced similar increases, but for more complex skills, women still lag behind. Nevertheless, the five-year comparison and the impressive differences in such a short period of time, for both sexes, suggest that forces of change are already set in motion. If this supposition proves to be correct, men and women will enlarge their command over computing in the coming years.

Egypt: Internet users make up almost 45% of the population, half are mobile internet users. Egyptian bloggers use internet extensively to tell stories and express their opinions.

Indonesia: Data on women's use of village / public knowledge centres indicates that from 2008 to 2009, while women are represented in quite good numbers as managers of village knowledge centers, especially in functional literacy centers and early childhood education centers in 2008 and 2009, the percentage of females using most of the centres declined, with substantial increases in functional literacy centres. Their representation as managers of knowledge centres also declined across the board, with increases in functional literacy centres and early childhood centres.

Table 72. Women as Users of (Village) Knowledge Centers

Type of Knowledge Center	2008		2009	
	Total	% F	Total	% F
Equivalency Education Center	863,454	45.22	512,402	43.2
Community Reading Center	531,778	60.6	207,458	52.0
Functional Literacy Centers	1,760,974	42.17	859,741	75.42
Community Learning Center	708,198	51.50	NA	NA
Life skills Education Centers	66,570	79.04	11,324	62.03
Early Childhood Education Centers	2,995,167	54.83	3,127.482	52.37

NA: Data Not Available
Source: Non Formal Education Statistics, Ministry of National Education, 2011

Table 73. Women as Managers of (Village) Knowledge Centre Unit: Persons; %

Type of Knowledge Center	2008		2009	
	Total	% F	Total	% F
Equivalency Education Center	32,284	48.16	55,149	39.43
Community Reading Center	3,506	52.19	5,941	42.82
Community Learning Center	11,770	20.07	22,161	42.64
Life Skills Education Centers	4,133	60.70	2,068	58.85
Functional Literacy Centers	157,308	49.40	81,100	82.29
Early Childhood Education Centers	104,016	76.94	257,411	85.08

Source: Non Formal Education Statistics, Ministry of National Education, 2011

4. What are the challenges to the implementation of WSIS outcomes? What are the challenges that have inhibited the emergence of a "people-centred, inclusive and development-oriented Information Society"?

Overall: Results are gendered in all countries included in this report, with males generally having greater levels of access as well as greater participation in the information economy. Key issues relate to women's participation in the IT workforce in terms of type of work (technical vs "soft"), level, and remuneration. The role of women as ICT entrepreneurs also should be fully supported. Programmes and support targeting women are needed to ensure that they also benefit from a people-centred

information society.

The role of ICT in increasing and perpetuating violence against women is a noted trend. They should provide women with tools to fight violence, trafficking, pornography and invasions of their privacy, as well as give women a voice for their rights and concerns and increase their ability to make decisions and choices that will benefit them and their families. The relationship between ICTs, gender equality, and women's empowerment leading to economic growth is well known (See Hafkin and Huyer, 2006).

Argentina: Female participation among undergraduate students in Engineering, manufacturing and construction was 20.9% in 2001 and 24.8% in 2009. Female participation in computing alone was 26% in 2001, decreasing to 19% in 2009. At PhD levels in Agricultural Sciences, Engineering and Materials, female representation increased from 12% in 2000 to 20% in 2012.

Brazil: Female representation in the information society workforce does not reflect trends in use and access. In education, female participation in engineering, manufacturing and construction at the tertiary level is approximately 27%, having changed very little in the past decade. In engineering, it is female participation is lower at 19.5%, up somewhat from 16% in 2000.

In the workforce, women's representation in S&T occupations as engineers, researchers and professors decreased in the area of engineering and technology researchers, from 25% to 19% between 2003 and 2010, while the percentage of professors in mathematics, statistics and computing increased from 38% to 41%. Ministry of Labor and Employment data on technology and information workers shows that female participation in categories such as "technology and information managers", "engineering and technological research", and "information technology analyst" is at around 20%. Their share of economic activity in "transport, storage and communications" was 13.7% in 2009, up from 9.2% in 2001.

Egypt: Firstly, increasing broadband connectivity, including looking at ways of reducing cost and making the service more affordable, through either monthly or data subscriptions Secondly, increasing local content and applications, and creating the necessary infrastructure to foster innovation of local content, specifically in education, entertainment and services. And lastly, developing financing mechanisms that will allow for commercialization of research, innovation and development through the use of private or public technology incubators and investment funds

India: At higher levels of education, females made up 4.2% of enrolments in Engineering/Technology in 2008-9, increasing to 7.7% in 2010-11. Data from 2005 indicate that women's participation as employees and hired workers in communications was approximately 16% of employees and 18% of hired workers. While data of women's representation in the computer industry is not collected at the national level, some research indicates that women comprise a significant percentage of software programmers in India and ranges between 24-26% – with higher percentages at the entry level, and a gradual drop out rate through their career, a result of the leaky pipe syndrome.

Indonesia: The percentage of females in engineering & tech in 2001-2 was 21.52, showing a slight increase in 2008-2009 to 27.41.

Although sex disaggregated data on workers are available at the Ministry of Manpower, ICT workers are included with the transportation and storage industries. The number of females working in this sector is very small. Of R&D personnel in manufacturing industries (2008), 3% of female workers were employed in electronics, while 11% of

male workers were in the same employment category. For engineering, 4.3% of female workers are in this category, in contrast to 20.8% of male workers.

Mexico: Although in higher education, women's participation has been considerably more important, it is important to note that female insertion in some careers is still low, like in the case of engineering, where the unevenness between the percentages of male and female enrollment is overwhelming. Of the 1,991 researchers in that field, 84.2% (1,677) are men and the remaining 15.8% (314) are women. This is because traditionally engineering has been considered as an area in which the male gender has a larger participation.

As the following Table shows, in the area of engineering and technology women's percentage is 31.1% opposed to 68.9% of the men. These numbers remain almost unchanged in both public and private subsystems, which allow us to see the prevalence of male participation in engineering and technology.

Of the Directors of the Scientific Research Institutes of the Autonomous University of Mexico (UNAM), the engineering institute has no female representation (2013).

Republic of Korea: In 2010, women's participation comprised only 14% in engineering. Since the mid-2000s, there has been little change in women's enrollment in science and engineering fields.

Female representation as professionals and technicians in information and communications technology in 2010 was 12.2%, and in engineering, 9.2%. The employment of women in Transport, Storage and Communications increased from 11.8% in 2001, to 14.0 in 2008. Data from the Survey Report on Labor Conditions by Employment Type by the Ministry of Employment and Labor (using the KSCO) show that among the group of "computer related professionals and associate professionals", women's share tends to be on the decline (from 22.5% in 2001 to 17.2% in 2010). This implies that the absolute number of women employees has risen, but less than for men. The share of women within the group of engineering professionals and related positions improved steadily from 8.8% (2001) to 11.3% (2010). Female researchers / women in S&T R&D employment type in engineering was 13.6%.

South Africa: Other sources, e.g. figures calculated from the General Household Survey also confirm high ownership of cell phones in South Africa. However, in Table 24 the unit of analysis is not the individual anymore but the head of household. Thus, if 88% of African female-headed households, for instance, reported access to a cell phone it can be because of a male member of the household that owns such a phone. Nevertheless, the table is interesting as it shows high levels of access to cell phones in every household in the country. On the other hand, household access to a cell phone does not allow for the same uses and opportunities as individual ownership of a cell phone, especially as far as the conduct of business is concerned.

Moreover, women, on average, spend about 31% of their monthly disposable income on cell phone expenses compared to 27% spent by men. Focus groups discussions indicate that the women in their study largely paid for their phone usage from whatever income they received. Cell phone expenses therefore impact on the household and food budget, but many women indicated that they primarily receive calls or make "missed calls" for people to return the call.

The lack of the use of internet service by especially women in rural and low-income regions has also been confirmed. They conducted a study on the use of information and communication technologies by 42 women hawkers and vendors in KwaZulu-Natal. Information was gathered through observation and interviews. The majority of women in the study possessed mobile phones, and other ICT used included landlines, radio and television. Computer technology, however, was absent, although the sampled women displayed a keen interest in its use. All of the surveyed women used radio and TV to listen to and watch business-related programmes, and

almost all of them used cell and land phones to make and receive calls to and from business partners, retail stores, product suppliers and distributors. However, none used ICT to search for business related information.

The ICT labour force appears to be strongly genderised. Overall in the African region, women are underrepresented and undermeasured in S&T in education, workforce and skills acquisition. They make up less than 30% of university researchers in the region.

In South Africa, core ICT work was still very much a male domain in 2005. More than 81.4% of those doing core ICT work were men and only 18.6% were women. The legacy of women staying away from things technical, both in career choice and in everyday use, thus still prevails in South Africa. The converse, however, applied to the ICT end -user component of the ICT workforce, where women comprised 74.4% of those performing administrative support and secondary ICT work activities, compared to 25.6% of men.

A slight change can be observed in the ratio of men to women in the ICT workforce between 2000 and 2005. In 2000, the total ICT workforce comprised 61.8% women and 38.2% men while women constituted 64.4% and men 35.7% of the total ICT workforce in 2005. However, the core ICT component among men marginally increased while the core ICT component decreased among women over this period. The female end-user component grew by 3.5% while the male end-user component decreased with 2.9% between 2000 and 2005.

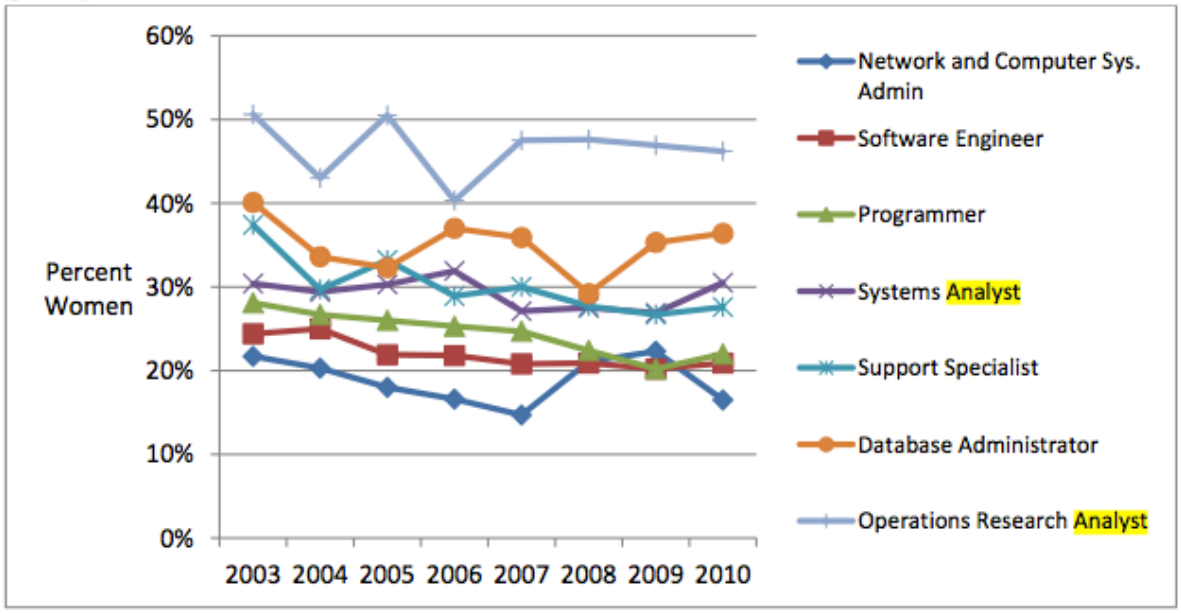
Between the periods 1996-1999 and 2000-2005, improvements can also be observed in the representation of female workers in ICT manufacturing (up by 8.8%) and in telecommunications (up by 8.3%). Meanwhile the female share of employment in the IT services sub-sector declined (down by 3.4%). Average annual growth rates of 12.8%, 4.5% and -1.8% in ICT manufacturing, telecommunications and IT services were recorded. It is interesting that more females were employed in the telecommunications sector during a phase in which overall employment growth was in decline. Also intriguing is that female's share of the IT services labour market declined in spite of the fact that general employment in this sector was increasing. Further investigation is needed to explore these apparently gendered patterns of employment across the three sectors.

The question of equitable access to employment in the occupations of computer professionals and associated professionals has been explored by examining race and gender representation. The numbers of black and white male professionals increased over the 1996 to 2005 period, while the numbers of their female counterparts decreased. In terms of annual average growth over the period, black male and white male representation increased by 2.3% and 2.5% respectively. Simultaneously, the average annual employment of black and white females declined by 2.2% and 1.1% respectively, between 1996 and 2005.

Moreover, women are critically under-represented in engineering professions in the country, e.g. only 16% in 2004, although it is an improvement over the 10% registered for 2000.

USA: Internet access is widespread and almost universal, either through either computer or cellphones, although marginalized groups are depending on mobile phones for their internet access. The representation of women in IT and computer-fields and employment is much lower than men's, at less than 50 percent of all people in almost all fields that require high level computer skills, and their participation has been decreasing since 2003:

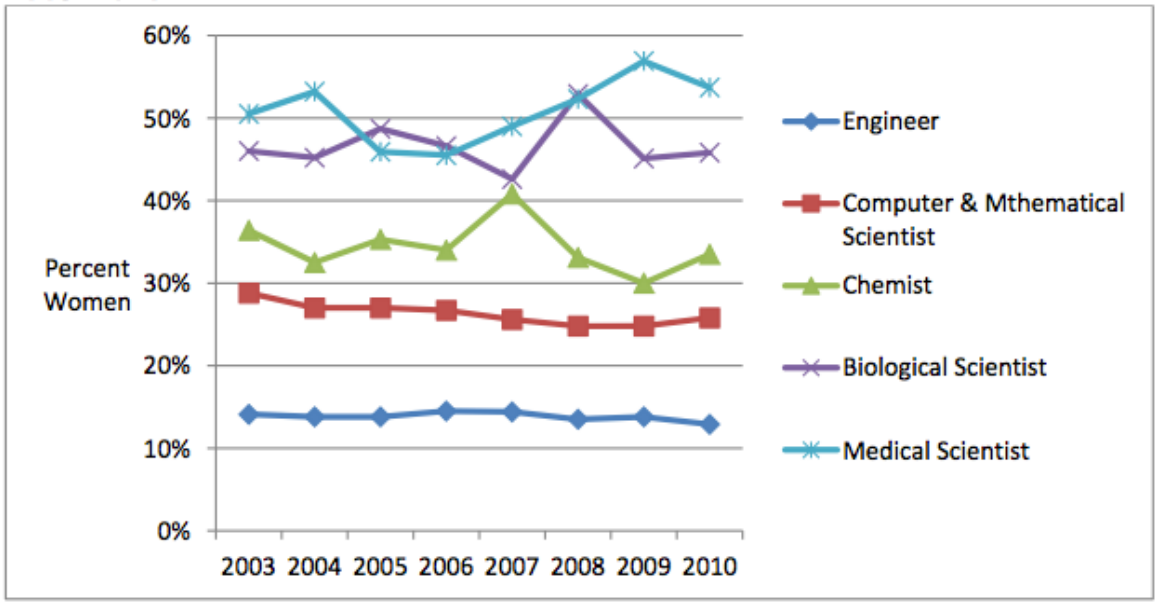
Figure 34. Women in Selected Fields requiring High-Level Computer Skills



Source: U.S. Department of Labor, Bureau of Labor Statistics

Females make up the lowest percentage of the engineering workforce of the natural sciences, with computer and mathematical sciences participation coming in at second last. It is also notable that female representation has been decreasing since 2003.

Figure 33. Percent of Women Scientists and Engineers in Selected Fields, 2003-2010



Source: U.S. Department of Labor, Bureau of Labor Statistics

5. How are these challenges being addressed? What approaches have proved to be effective in your experience?

Egypt: A degree of political certainty is required so that the private sector will invest in strengthening ICT infrastructure

India: The Common Service Centre Scheme for providing support to establish 1 lakh CSC in villages to promote them as village level entrepreneur (VLE)– a delivery point to public and private services to rural citizens..90.000 have been established under the Natil e-governance plan for IT-literacy for women. Many of these Centres have women actively involved. Some of the Village Knowledge Centres also function as CSC and is point through which functional literacy for women and men are addressed. There is immense diversity in India where in ICT is being used innovatively at grass roots and has become a hotbed for IT applications to meet the needs of the villagers in the rural areas. With increasing feminisation of agriculture and with extension services not up to the mark, these centres have become hub of activities in addressing the gap in extension services which are built on PPP mode. There are very many innovative models which address the local specific needs of the farm households and rural women. They also serve as hub centres for various capacity building programmes for the rural women and men in terms of accessing technologies, the right kind of knowledge and marketing platform. While ICT is a mere tool the way this is put to use in a productive manner brings out the innovativeness. It is here that the CSC and Village knowledge Centres can play a vital role. While there is no systematic data on the number of women who use them or as managers, there are number of case studies which reveal that they do play a good role. Some of the examples include the VKC/VRC of the M Swaminathan Research Foundation, the SEWA model, etc.

Some of the examples on how Mobiles can save India's poor women cited by Osama Manzar –Member of the working group IGF at the Ministry of IC–T include: Barefoot College at Ajmer in Rajasthan has been using mobiles along with community radio to serve 25,000 women from 200 villages in training, livelihood programmes and health services—50% of these women have their own mobiles that they are using to interact and convert opportunities into economic gains. Members of the well-known organisation SEWA (Self Employed Women Association) in Gujarat use voice-based system and symbol-based SMS system providing them access to market information. Uninor partnered with the department of telecommunication to launch the Sanchar Shakti voice-based service for women to deliver information, expert advice and news alerts on health, education, self employment and finance, in cooperation with self help groups (SHGs), NGOs, and educational institutions. The Commonwealth of Learning and the Vidiyal SHG created 500 audio messages on a variety of topics that were sent to women on a daily basis to promote lifelong learning, with the specific aim of supporting their businesses. In Jeend in Haryana, Kisan Sanchar has been serving women farmers group through mobile for agriculture extension services and they use voice-based as well as SMS-based platform to reach out. In Konark in Orissa, Young India has achieved 100% attendance of girl students in Gop Block schools through the integrated use of Mobile and community radio.

South Africa: The Gender and Development Unit at the Human Sciences Research Council undertook a quantitative and qualitative assessment of the participation of women in the industrial science, engineering and technology sector. The study was conducted on behalf of the (then) South African Reference Group on Women in Science and Technology (SARG) of the National Advisory Council on Innovation. In the quantitative study a questionnaire was administered to a sample of 90 women in SET companies across South Africa, of which 46% were from state-owned enterprises. The respondents identified the work environment as a key factor in facilitating or inhibiting women's participation in the SET sector. For example, feedback on work performance, remuneration and promotion opportunities, gender relations in the workplace, race relations, mentorship and career development

opportunities, and implications of a career on in SET for family life, were factors identified as playing a role in determining women's participation in the SET industry.

Moreover, based on the in-depth interviewing of 38 senior women and CEOs from the same study, several factors were identified as facilitating or inhibiting women's recruitment, retention and advancement in industrial SET. These include the masculine image of science; gender-blind workplace policies with no emphasis on female participation; the casting of women into supportive roles; the challenge of balancing work and family responsibility; women's status as "previously disadvantaged individuals" (PDIs) which could result in them becoming complacent and regularly changing positions as they are popular to appoint due to their PDI status; gender discrimination and masculine organisational culture; sexual harassment; and the "'glass ceiling".

A report by the National Advisory Council on Innovation also highlights a number of critical challenges that South African women in the current SET workforce are confronted with throughout their lifecycle. The challenges are derived from commissioned research and consultative conferences on women in science that took place during 2005. The identified challenges must be addressed at policy level in order for women to participate in and benefit equitably from the SET sector. These challenges include: (1) historical factors, (2) gender stereotyping within the family and society, (3) barriers experienced at primary, secondary and tertiary education levels, (4) barriers, obstacles and constraints at SET workplaces, and (5) public funding of SET/R&D activities.

Initiatives to support and strengthen the participation and contribution of women scientists

The National Research Foundation (NRF) is the official research funding agency in South Africa. The Research and Innovation Support and Advancement (RISA) division of the NRF is the agency that translates the S&T strategies and policies of government into programmes and initiatives that support research institutions and researchers. The key function of RISA is to ensure that the country has appropriately qualified people and the necessary high-level infrastructure to produce knowledge that can transform the economy of South Africa into one that can compete globally. RISA, among other functions, provides expertise in research management through models such as the Centres of Excellence (CoEs) and the South African Research Chairs Initiative (SARChI), and manages a grant-making and administration service. Funding support is provided to postgraduate studies at the honours, masters and doctoral levels, as well as to postdoctoral fellows.

The NRF also manages a rating system that identifies researchers who count among the leaders in their fields of expertise and gives recognition to those who constantly produce high quality research outputs. Several South African universities use the outcomes of the NRF evaluation and rating process to position themselves as research-intensive institutions, while others provide incentives for their staff members to acquire and maintain a rating and give special recognition to top-rated researchers. Of the nearly 16 000 staff members in academic and related positions at South African higher education institutions, 10% have a valid rating from the NRF. Moreover, rated researchers produce some 70% of the research students funded by the NRF, as well as 70% of the research outputs in the Web of Science generated via NRF funding. In the evaluation and rating of individual researchers, the NRF approaches external experts to review researchers in South Africa who have reached the highest standards of research, as well as those who have the potential to become future research leaders. These expert reviewers base their opinions on the quality and impact of each applicant's research outputs and achievements. They assess each applicant's standing as a researcher based on his/her work over the past eight years.

The South African Research Chairs Initiative (SARChI) is a knowledge and human capacity- building intervention that is managed by the NRF on behalf of the Department of Science and Technology. The programme funds research chairs with excellent research track records in any discipline. SARChI has five main objectives:

- Expand the scientific research and innovation capacity of South Africa;
- Improve South Africa's international research and innovation competitiveness while responding to social and economic challenges of the country;
- Attract and retain excellent researchers and scientists;
- Increase the production of Master's and doctoral graduates; and
- Create research career pathways for young and mid-career researchers with a strong research, innovation and human capital development output trajectory.

The SARChI initiative is proving to be an effective instrument for developing human capital. The initiative is successfully contributing to the transformation of South Africa's cohort of scientists. The number of postgraduate students supported by research chair grants has grown, e.g. from 115 in 2007 (when there were only 21 research chairs) to 423 in 2009 (under 72 research chairs). Of the students supported in 2009, 47% were female. In addition to students supported by and from the SARChI grants, research chair holders also mentor students supported from other sources of funding. The number of these students increased from 252 in 2008 to 367 in 2009. At the end of 2010, 20% of the research chairs were female. Moreover, the Thuthuka Programme of the NRF, initiated in 2001, is central to the organisations human capital development strategy. The programme aims to develop human capital and to improve the research capacities of designated (i.e., black, female and disabled) researchers, ultimately redressing historical imbalances. This is done in partnership with South African universities and research institutions. The programme seeks to achieve this through its specific research grant which funds grant holders participating in research from a wide range of scientific disciplines. While the primary aim of the Thuthuka programme remains to promote professional development of researchers from designated groups, participation of non-designated individuals are not excluded.

Another example is the Technology for Women in Business (TWIB), which, since 1998, has helped women apply technology to support and grow their businesses, thereby assisting in the mainstreaming of women's businesses within the broader South African economy. TWIB was introduced to accelerate women's empowerment and women-owned enterprise development through the facilitation of technology-based business applications and systems and in the process, unlock constraints to enterprise innovation and growth, as well as local and global competitiveness. TWIB's mandate extends to programmes that encourage girls to choose careers in engineering, science and technology by facilitating access to educational information, career opportunities, academic and extramural learning programmes, and by creating successful female role models.

In relation to encouraging women in S&E education, If one considers the share of women among all students enrolled for distance programmes at South African universities it is clear that this mode of university training is increasingly becoming attractive to women. The female share of distance university students has been consistently growing, from 56% in 2001 to 60% in 2009.

6. What do you consider the most important emerging trends in technology and other aspects of ICTs which have affected implementation of WSIS outcomes since the Summit? What has been their impact?

The 3G technology this affected the mobile penetration rate became 115% and the mobile internet users are 50% of the internet users.

A continuing imbalance in control of ICT for women in many countries around the world, as well as low levels of participation in the information economy and the fields and employment which are responsible for the development of the information society. This imbalance means that not only are women not benefitting as much as men from the information society in terms of access to information, freedom of information and knowledge, and economic benefits, but it also means they have less of a voice in determining what the information society will look like as we move into the age of the Internet of things.

7. What should be the priorities for stakeholders seeking to achieve WSIS outcomes and progress towards the Information Society, taking into account emerging trends?

Effective collaboration between all stakeholders, with a focus on innovation entrepreneurship and SME's.

Targeted work to ensure that women have equal access to and control over ICT, that it benefits them in the ways they need it to, that they are educated in IT related fields, and that they can use it to increase their knowledge and education and generate increased income.

8. What role should information and communications play in the implementation of the post-2015 development agenda?

Attract foreign direct investment and create job opportunities.

Promote access to information and knowledge that will enable people to develop their own solutions to development challenges.

ICT is a development enabler since ICT offer flexibility of time and space, end isolation, and increase access to knowledge and productive resources. Women suffer most from limited time availability, social isolation, and lack of access to knowledge and productive resources. Enabling women's access to and control over ICTs is a key steps for poverty alleviation and sustainable development.

9. Please add any other comments that you wish to make on the subject of the review that you believe would be helpful.

Ethical issues related to the ICT sector should be emphasized in achieving socio -economic development & gender and social equality.

References[4]:

Abreu, Alice, 2012. National Assessment of Gender, Science, Technology and Innovation - Brazil Qualitative Report, Gender Equality and the Knowledge Society - National Assessments on Gender and STI, Brazil. Prepared for WISAT-OWSD.

ASSAf, 2011. Participation of women and girls in the national STI system in South Africa based on the Gender Equality – Knowledge Society Framework. WISAT-OWSD.

[4] Available from www.wisat.org.

Ephraim, Arnell, 2012. Gender Equality and the Knowledge Society: Indicators from the United States of America. WISAT-OWSD.

Hermawati, Wati and Rina Saari, 2012. National Assessment on Gender Equality and the Knowledge Society - Case of Indonesia.

Hafkin, N. Gender and ICT issues in Africa. Women in Global Science and Technology (WISAT), 2010.

Nancy Hafkin and Sophia Huyer. 2006. Cyberella or Cinderella? Empowering Women in the Knowledge Society. New Hampton: Kumarian Press.

Huyer, S. and N. Hafkin. Global Synthesis, National Assessments on Gender and STI. Women in Global Science and Technology, 2012.

Kim, Young-Ock and You-Kyung Moon, 2011. National Assessments on Gender and Science, Technology and Innovation (South Korea). Prepared for WIGSAT-OWSD.

Nair, Sudha, 2011. National Assessment of the Participation of Women and Girls in the National STI system based on the Gender Equality-Knowledge Society Framework. Indian Report, prepared for WIGSAT-OWSD.

Suggested additional documents:

1. Análisis de la integración de la perspectiva de género en las agendas y políticas digitales de Latinoamérica y el Caribe - http://repositorio.cepal.org/bitstream/handle/11362/4080/S2013345.pdf?sequence=1

2. The Santo Domingo Consensus was drafted at the twelfth session of the Regional Conference on Women in Latin America and the Caribbean, held in Santo Domingo from 15 to 18 October 2013.

http://www.cepal.org/cgi-bin/getprod.asp?xml=/12conferenciamujer/noticias/paginas/5/49995/P49995.xml&xsl=/12conferenciamujer/tpl-i/p18f-st.xsl&base=/12conferenciamujer/tpl-i/top-bottom.xsl

3. Lifting the veil on ICT gender indicators in Africa, Research In Action, 2012

http://www.researchictafrica.net/publications/Evidence_for_ICT_Policy_Action/Policy_Paper_13_-_Lifting_the_veil_on_ICT_gender_indicators_in_Africa.pdf

4. Access to ICT education for girls and women in rural South Africa: A case study, Nomusa Dlodlo Technology in Society, Volume 31, Issue 2, May 2009, Pages 168‑175

5. Asia-Pacific Journal of Rural Development Vol. XIX, No. 1, July 2009. ICT and Empowerment of Rural and Deprived Women in Asia. D. A. Patil*, A. M. Dhere**, C. B. Pawar**,