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SUSUNAN REDAKSI

REDAKSI WARTA KEBIJAKAN IPTEK & MANAJEMEN LITBANG
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Warta Kebijakan Iptek dan Manajemen Litbang (KIML) adalah jurnal ilmiah yang dimaksudkan untuk menjadi forum ilmiah tentang teori dan praktik kebijakan ilmu pengetahuan dan teknologi (Iptek) dan manajemen penelitian dan pengembangan (litbang) maupun manajemen inovasi di Indonesia. KIML dimaksudkan sebagai wadah pertukaran pikiran peneliti, akademisi dan praktisi kebijakan iptek untuk pembangunan ekonomi. KIML juga berisi sumbangan ilmiah dalam manajemen litbang dan inovasi untuk daya saing eknonomi. Tulisan bersifat asli berisi analisis empirik atau studi kasus dan tinjauan teoretis. Redaksi juga menerima tinjauan buku baru tentang kebijakan iptek dan manajemen litbang dan inovasi. Terbit dua kali setahun pada bulan Juli dan Desember.

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PENGANTAR REDAKSI

Warta Kebijakan Iptek & Manajemen Litbang (KIML) Volume 8 No. 1 Tahun 2010 hadir dengan tampilan baru yang lebih segar baik dari segi ukuran maupun tampilan isi. Penyegaran ini merupakan komitmen untuk menghadirkan kualitas yang lebih baik.

Enam bahasan akan dikemukakan oleh para penulis yang terpilih, yang menkritisi masalah-maslah dalam kebijakan iptek dan manajemen litbang. **Nani Grace Simamora** dan **Irene M Nadhiroh** mengawali edisi kali ini dengan judul "Kajian Inovasi Industri Manufaktur: Pola Interaksi Perusahaan dalam Mengembangkan Kegiatan Inovasi". Tulisan ini menggunakan data sekunder yang diperoleh dari hasil survey inovasi perusahaan manufaktur yang dilakukan oleh Pappiptek-LIPI pada tahun 2009, untuk menggambarkan kerjasama inovasi yang dibangun oleh perusahaan-perusahaan manufaktur di Indonesia. Pada penelitian ini berhasil menunjukkan bahwa mayoritas perusahaan masih melakukan kegiatan inovasi secara mandiri. Selain itu, penelitian ini juga menemukan bahwa perusahaan yang melakukan kerjasama dengan aktor terkait memiliki kinerja inovasi lebih baik daripada perusahaan-perusahaan yang tidak melakukan kerjasama. Perusahaan yang bekerja sama dengan instansi lain melakukan kegiatan inovasi lebih dari satu jenis hasil.

Tulisan berikutnya dari **Wati Hermawati** dengan judul *"Situation Analysis of Women's Participation In Science and Technology In Several Asian Countries: Challenges for The Implementation of Gender Equality and Equity"*. Tulisan ini berfokus pada analisis situasi perempuan dalam kegiatan Iptek pada sebelas negara Asia. Diskusi lebih lanjut difokuskan pada partisipasi perempuan dalam Iptek, dan kesenjangan antara laki-laki dan perempuan dalam kegiatan Iptek. Dengan menganalisis data dan informasi dari pustaka yang ada, diketahui bahwa proporsi penduduk laki-laki dan perempuan di banyak negara hampir sama namun peran perempuan dalam ilmu pengetahuan dan teknologi (Iptek) di banyak negara relatif rendah dibandingkan dengan laki-laki. Rendahnya representasi perempuan pada kegiatan Iptek terutama di pendidikan tinggi, Karir bidang Iptek, penasihat bidang Iptek dan struktur pengambilan keputusan bidang Iptek. Beberapa hambatan bagi perempuan untuk memasuki arena Iptek sebagian besar adalah: (1) budaya, nilai-nilai, termasuk sikap yang stereotipe gender, yang tidak mendukung partisipasi perempuan dewasa dan remaja perempuan dalam Iptek; 2) kondisi ekonomi, (3) kurangnya lingkungan yang responsif gender dan kebijakan yang membatasi jumlah perempuan dalam karir Iptek. Kurangnya data terpilah dan statistik berbasis jenis kelamin di bidang Iptek menjadikan mustahil untuk mengekspresikan wawasan yang memadai tentang kunci isu-isu perempuan dan gender dalam Iptek. Beberapa kebijakan negara

tentang gender dan pembangunan serta inisiatif untuk merangsang masuknya perempuan dalam arena Iptek juga dibahas dalam studi ini.

Sementara itu pada tulisan ketiga yang berjudul "Skenario Penyediaan Kedelai di Indonesia: Sebuah Analisis Kebijakan", yang ditulis oleh **Trina Fizzanty dan Erman Aminullah** berhasil menjelaskan model sistem dinamis penyediaan kedelai dan analisis kebijakan kedelai di Indonesia berdasarkan hasil simulasi komputer. Model menghasilkan tiga skenario kedepan: (i) skenario normal yang ditunjukkan oleh pencapaian stabilitas penyediaan melalui pengelolaan impor dan dalam jangka panjang harga akan turun; (ii) skenario membaik yang ditunjukkan oleh kestabilan penyediaan yang mungkin dicapai dengan meningkatkan produksi dan mengurangi impor, sehingga harga akan turun dalam jangka panjang; (iii) skenario terbaik ditunjukkan oleh kestabilan penyediaan melalui peningkatan produksi dan pengurangan impor serta pengaturan pasar. Mengacu pada skenario terbaik, maka: (1) Bulog (Badan Urusan Logistik) seharusnya tetap berperan sebagai badan penyeimbang untuk bisnis swasta untuk menjamin efisiensi pasar di masa depan; dan (ii) kurangi penggunaan kedelai impor dan sebagai gantinya tingkatkan produksi kedelai lokal berbasis bioteknologi yang ditujukan untuk memenuhi kebutuhan pakan (sebagai contoh: bungkil kedelai untuk industri ternak).

Tulisan keempat berasal dari penelitian **Sik Sumaedi** dan **Darmawan Baginda Napitupulu** berjudul "Analisa Kepuasan Pelanggan Berbasis IPA: Studi Kasus Peserta Pelatihan di Sebuah Institusi Riset". Penelitian ini menggambarkan penerapan metode *Importance Performance Analysis* pada pengukuran kepuasan peserta pelatihan institusi riset. Metode penelitian menggunakan pendekatan studi kasus pada sebuah institusi riset sistem mutu. Pengumpulan data dilakukan dengan survei menggunakan alat kuesioner pada peserta pelatihan objek penelitian. Hasil penelitian menunjukkan bahwa indeks kepuasan pelanggan pelatihan objek kajian secara keseluruhan puas, rata-rata tingkat penilaian kinerja sebesar 3.59, rata-rata tingkat kepentingan sebesar 4.033. Selain itu, dalam tulisan juga mengungkapkan faktor-faktor perbaikan yang perlu dilakukan dan karakter institusi riset yang mempengaruhinya.

Amir Asyikin Hasibuan pada tulisan kelima mengangkat kajian berjudul "Sifat-Sifat Kewirausahaan dan Kinerja Bisnis Organisasi: Studi Empiris Pada Sejumlah Perusahaan Industri Kecil". Kajian ini meneliti dampak dari sifat-sifat kewirausahaan dari pengusaha industri skala kecil terhadap kinerja organisasi. Partisipan terdiri dari 50 pengusaha industri skala kecil yang mengisi instrument yang mengukur sifat-sifat kewirausahaan. Teknik analisis menggunakan regresi jamak. Hasil studi menunjukkan dukungan yang kurang terhadap hipotesis tentang pengaruh tiga sifat kewirausahaan (prestatif, luwes bergaul dan kontrol diri) terhadap kinerja organisasi. Ketiga sifat kewirausahaan ini hanya dapat memprediksi 8,00 dari kinerja organisasi. Implikasi untuk praktek manajerial dan riset di masa datang juga didiskusikan.

Mohamad Arifin pada tulisan keenam menyuguhkan penelitian berjudul "Dampak Difusi Teknologi Lembaga Litbang: Studi Kasus Di Sumatera Selatan dan Sulawesi Selatan, Indonesia". penelitian ini mengambil dua studi kasus yakni kegiatan teknologi tepat guna BPPT di Sumatera Selatan yaitu agro techno park (ATP) dan kegiatan Batan di Sulawesi Selatan yaitu demfarm varietas padi dan penggemukan sapi. Format yang digunakan dalam pengukuran kegiatan litbang merupakan modifikasi dari format evaluasi yang tercantum dalam *Design and Implementation of the Project Process Management System.* Dampak diukur dengan menggunakan statistik inferensia yakni uji proporsi. Pengukuran dengan format ini menghasilkan tingkat kekuatan dampak masing-masing kegiatan pada aspek sosial, ekonomi, dan pengembangan iptek. Dampak difusi teknologi tersebut terhadap peningkatan kesejahteraan masyarakat khususnya pada aspek ekonomi masih sangat kurang. Sedangkan pada aspek pengembangan iptek, telah ada dampak yang baik pada masyarakat dilihat dari tumbuhnya kepedulian dan dukungan masyarakat pada kegiatan-kegiatan pengembangan iptek.

Akhirnya tak ada gading yang tak retak, kritik dan saran kami harapkan demi kemajuan Warta di edisi-edisi mendatang. Selamat membaca!

Jakarta, Juli 2010

Redaksi Warta

SITUATION ANALYSIS OF WOMEN'S PARTICIPATION IN SCIENCE AND TECHNOLOGY IN SEVERAL ASIAN COUNTRIES: CHALLENGES FOR THE IMPLEMENTATION OF GENDER EQUALITY AND EQUITY[1]

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ABSTRAK

Pemahaman bahwa bakat dan minat ilmiah orang Asia harus ditemukan dan dikembangkan baik oleh perempuan maupun laki-laki dari negara-negara Asia. Selain itu, laki-laki dan perempuan dari negara-negara Asia harus bekerjasama secara harmonis untuk mengembangkan dan menerapkan ilmu pengetahuan dan teknologi untuk manusia yang berpusat pada pembangunan berkelanjutan. Tujuan dari studi literatur ini adalah untuk menentukan pelaksanaan kesetaraan dan keadilan gender di negara-negara Asia dengan mengidentifikasi situasi partisipasi perempuan dalam ilmu pengetahuan dan teknologi (Iptek). Namun demikian, makalah ini hanya berfokus pada analisis situasi perempuan dalam kegiatan Iptek pada sebelas negara Asia. Diskusi lebih lanjut difokuskan pada partisipasi perempuan dalam Iptek, dan kesenjangan antara laki-laki dan perempuan dalam kegiatan Iptek. Dengan menganalisis data dan informasi dari pustaka yang ada, diketahui ahwa proporsi penduduk laki-laki dan perempuan di banyak negara hampir sama namun peran perempuan dalam ilmu pengetahuan dan teknologi (Iptek) di banyak negara relatif rendah dibandingkan dengan laki-laki. Rendahnya representasi perempuan pada kegiatan Iptek terutama di pendidikan tinggi, Karir bidang Iptek, penasihat bidang Iptek dan struktur pengambilan keputusan bidang Iptek. Beberapa hambatan bagi perempuan untuk memasuki arena Iptek sebagian besar adalah: (1) budaya, nilai-nilai, termasuk sikap yang stereotipe gender, yang tidak mendukung partisipasi perempuan dewasa dan remaja perempuan dalam Iptek; 2) kondisi ekonomi, (3) kurangnya lingkungan yang responsif gender dan kebijakan yang membatasi jumlah perempuan dalam karir Iptek. Kurangnya data terpilah dan statistik berbasis jenis kelamin di bidang Iptek menjadikan mustahil untuk mengekspresikan wawasan yang memadai tentang kunci isu-isu perempuan dan gender dalam Iptek. Beberapa kebijakan negara tentang gender dan pembangunan serta inisiatif untuk merangsang masuknya perempuan dalam arena Iptek juga dibahas dalam studi ini .

Kata kunci: perempuan, iptek, kesetaraan dan keadilan gender, negara-negara Asia

[1] Part of the content has been presented at the 9th Science Council of Asia Conference in Singapore, 18 June 2009

ABSTRACT

It is our understanding that scientific talents of Asia are to be found and developed out of both women and men of the Asian countries. In addition, both men and women of the Asian countries or all citizens of the Asian countries must work together harmoniously to develop and apply science and technology for human-centered sustainable development. The aim of this literature study is to determine the implementation of gender equality and equity in Asian countries by identifying the situation of women's participation in science and technology (S&T). However, this paper only focuses on the situation analysis of women in S&T in the eleven Asian countries. Further discussion focused on the participation of women in S&T, and the gaps between men and women in S&T activities. By analyzing data and information from the literature, it is found that the proportion of men and women population in many countries are almost equal however the role of women in S&T in many countries are relatively low as compared to men. The under representation of women in S&T is mainly in higher education, S&T careers and structural decision making and advisory bodies of S&T. Several impediments of women to enter S&T arenas are mostly relate to (1) the traditional culture, values including gender stereotyped attitudes, that do not support the participation of women and girls in S&T ; (2) poor economic conditions; (3) lack of gender responsive environment and policies that limits provision of women in S&T careers. Lack of sex disaggregated data and statistics in S&T makes it impossible to adequately reveal insights of key issues of women and gender in S&T. Some country's policies and several initiatives to stimulate women's entry in the S&T arenas are also discussed in this study.

Keywords: women, science and technology, gender equity and equality, Asian Countries

1. INTRODUCTION

At present, the advancement of Science and Technology (S&T) has given many advantages to the people and society. However, the role of women both as agents and beneficiaries of science and technology development is generally lower than that of men, although women constitute half of the population. The fact that women constitute 2/3 of the world 876 million illiterate and 70% of the world's poorest people demonstrate both the root causes and the impact of women low presence in S&T (UNESCO, 2002). World wide data and statistics show that in many countries, women constitute half of the school entrants, half of the consumers of technology product, and therefore, they are considered as an underutilized talent. RESGEST (2006) shows that Asian women in general do not have a strong presence in S&T fields. Until now, the issues concerning women and girls in S&T are very similar across different countries, namely lack of participation in S&T, as well as unequal access to the benefit of S&T. The under representation of women in S&T is clearly demonstrated in the fields of education, S&T careers, decision making structures and advisory bodies. There are more boys than girls who take S&T subjects in the higher education. There are more men than women who pursue careers in S&T sectors. There are more men than women in the S&T decision making positions, which led to gender inequality in S&T.

Gender equality means that the rights, responsibilities and opportunities of women and men does not depend on whether they are born male or female. Gender equality is

also defined in terms of an equal distribution of economic power, as well as a distribution of influence, power and opportunities which are based on parity. Further more, gender equity also means fairness of treatment for women and men, according to their respective needs. This may include equal treatment, or treatment that is different but which is considered equivalent in terms of rights, benefits, obligations and opportunities UNESCO (2000-a). Therefore, S&T should benefit all members of society equitably. Unless women's access to S&T (including access to education, career, leadership position) improves, women's social and economic status could not be improved.

Two broad issues regarding women in the daily life, that led to gender inequality: first, women's perception of their role and function in society, and second, society's expectation of their contribution. Women with S&T careers for example must pursue two responsibilities: the management of the home and family, and the fulfillment of job responsibilities. Family responsibilities, either as choice or as a result of cultural enforcement, have impaired women's capacity to fully develop their potentials including that in S&T. Consequently women are put in a disadvantage position including, in the S&T related career which are very dynamic and competitive in nature.

The issue of gender equality in S&T has been raised in many national and international fora and has become a national agenda of many developed as well as developing countries. The World Conference on Science (1999) states that: "Equal access to science is not only a social and ethical requirement for human development, but also essential for realizing the full potential of scientific communities world wide and for orienting scientific progress towards meeting the needs of human kind" (UNESCO, 2000-b). The United Nations Millennium Summit (2000) adopted a Millennium Declaration and sets 8 Millennium Development Goals to be achieved by 2015. One of the 8 Goals, Goal 3 calls for "Empower women and promote equality between women and men". These two commitments are the latest reflection of the international communities' series concerns about gender in-equality in S&T in view of the fact that S&T is one of the essential cross cutting components for meeting sustainable human development.

Therefore, the challenge is to build societies where women and men can reach their full human potential and participate equally in the development process including in S&T, sharing its wealth and benefit on the basis of parity to achieve better life in the future within the context of the world endeavor to promote and protect human rights and social justice for all.

S&T encompass a broad range of activities, starting from the knowledge and technology generation activities until the application of scientific knowledge and technology. In developing countries, the development of S&T is generally acknowledged as the main role in promoting economic development and improving the lives and livelihoods of people in rural and urban areas. Within this context, women's participation in S&T includes the extent to which women have been able to get involve in S&T activities as well as in the utilization of S&T in capturing the same opportunities available to men, ranging from the field of study, teaching, research and development, up to high-skilled employment in the private sectors or industry. It is therefore, situation analysis of women participation in S&T involves evaluating all aspects of the present status of women in S&T arenas, including the situation and trends of women participation in higher education, R&D activities, economic sector and position of women at S&T decision making and advisory council.

Based on the literature study from various papers and publications including conclusions, recommendations and plans of action of international and regional conferences related to the issue of women, gender and S&T within the context of human centered sustainable development, this paper review the involvement as well as possible impediments of women's participation in S&T in 11 (eleven) Asian countries, namely: China, India, Indonesia, Japan, Republic of Korea, Malaysia, Mongolia, The Philippines, Singapore, Thailand and Vietnam.

To have a glimpse of the prospects of gender equality and equity in science and technology (GEST) in 11 (eleven) Asian countries, data have been taken for analysis among others from the Millennium Development Goals - MDG Report (2005), the World Competitiveness Report (2004), UNESCO Institute for Statistics (UIS), National Focal Points of the Regional Secretariat of GEST (NFP-RESGEST) country reports, UNESCO (2005) and Human Development Report, UNDP, 2007/2008. Data and information, specifically those relating to relevant Millennium Development Goals' indicators, women as agents of S&T, the economic outlook of member countries and perceived GEST prospects by the NFPs of RESGEST have been the basis for discussion in this paper.

2. THE STATE OF WOMEN IN S&T IN ELEVEN ASIAN COUNTRIES

S&T encompass a broad range of activities, starting from the knowledge and technology generation activities until the application of scientific knowledge and technology. Within this context, women's participation in S&T includes the extent to which women have been able to get involve in S&T activities as well as in the utilization of S&T in capturing the same opportunities available to men, ranging from study, teaching, research and development, to high-skilled employment in the private sectors or industry. However, before discussing the gender issues and the involvement of women in S&T in these countries, a general information regarding women in each country will be highlighted in this section.

Women in almost all countries, make up almost the balance number of the men population. World data on gender parity in education is also improving and the trend of the number of illiterates adults (aged 15 years and over) show a steady fall from 22.4 % (872 millions) of the world's population in 1995 to 20.3% (862 millions) in 2000 and UIS estimates this should drop to 824 millions or 16.5% by 2010 (Williams, 2002). However, in general the percentage of women illiterate is more than men in many countries. Similar situation also prevails in this study except the Philippines (44%). In many countries, life expectancy has increased, but the indicators of health treatment, such as in the case of the complication of pregnancy and childbirth have demonstrated that women have not benefited fully as shown by the MMR (Maternal Mortality Rate) and IMR (Infant Mortality Rate) indicators. India and Indonesia are among the countries which have the highest rate of maternal mortality as well as infant mortality rate, as presented in Table 1.

Table 1: Population of Several Asian Countries by sex

Country	Total Population	Female	Illiterate Female Population aged 15 and over (% of total)	Ratio Male to Female	MMR per 100.000 live birth, 2005	IMR per 1.000 live birth, 2005
	Estimated data July 2007		*)		**)	**)
China	1.321.851.888	641.560.628	73 2000	1.06	45	23
India	1.129.866.154	547.421.878	NA	1.06	450	56
Indonesia	234.693.997	117.295.642	69 2004	1.00	420	28
Japan	127.433.494	65.254.898	NA	0.96	6	5
Rep of Korea	49.044.790	24.404.165	NA	1.01	14	5
Malaysia	24.821.286	12.338.067	64 2000	1.01	62	10
Mongolia	2.951.786	1.475.774	56 2000	1.00	46	39
Philippines	91.077.287	45.552.580	44 2003	1.00	230	25
Singapore	4.553.009	2.330.252	77 2000	0.96	14	3
Thailand	65.068.149	32.887.521	66 2000	0.98	110	18
Vietnam	85.262.356	43.014.722	69 1999	0.98	180	16

Source : www.photius.com/rankings/population/sex_ratio_total_population_2005_1.html - 55k - CIA World Fact Book on Population, access : 13 May 2009.

*) Global Education Digest, 2007, Comparing Education Statistics Around the World, UIS Montreal, 2007

**) UNDP, Human Development Report 2007/2008

The indicators of Human Development Index (HDI), Gender Development Index (GDI) and Gender Empowerment Measures (GEM) can be an indicator of women and gender development in the country. UNDP (2008) with the Human Development Report (2007/2008) has calculated the three indicators and ranked the countries from the highest to the lowest. Among countries studied, Japan is the highest in terms of HDI and GDI. Singapore is the highest for GEM. Whereas the lowest rank for HDI and GDI is India and for GEM is Mongolia as shown at Table 2 below. Detail data related to these indicators are also discussed in the next section.

Table 2 Score and Rank of HDI, GDI and GEM of SCA Member Countries, 2007/2008

	HDI		GDI		GEM	
Country	Rank	Value	Rank	Value	Rank	Value
Japan	8	0.953	13	0,942	54	0,557
Singapore	25	0.922	NA	NA	16	0,761
Rep. of Korea	26	0.921	26	0,910	64	0,510
Malaysia	63	0.811	58	0,802	65	0,504
Thailand	78	0.781	71	0,779	73	0,472
China	81	0,777	73	0,776	57	0,534
Philippines	90	0.771	77	0,768	45	0,590
Vietnam	105	0.733	91	0,732	52	0,561
Indonesia	107	0.728	94	0,721	NA	NA
Mongolia	114	0.700	100	0,695	77	0,429
India	128	0.619	113	0,600	NA	NA

Source : UNDP, HDR 2007/2008

3. THE SITUATION OF WOMEN IN S&T

Over the years, greater involvement of women in S&T has been increasingly supported by society at large. Their involvement in S&T arenas has also increased slowly in the form of participation in education or academic activities; research and development activities; women in the economic sector and women in S&T decision making positions. Further discussion of women participation at each S&T activities is presented in this section.

3.1 Women and Gender Equality in Education

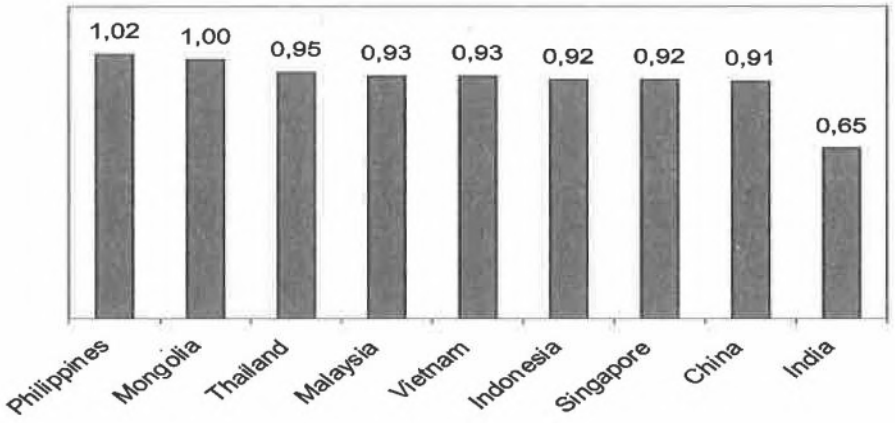
Education is the key to women's participation in S&T. Education leads to greater choices. But 115 million children of primary school age are denied this right (United Nations, 2005). The loss of opportunity to education does not affect children alone, but also family and the country, as education is the key to human empowerment in particular the empowerment of girls and women in many fields including S&T, such as:

- Education, especially for girls, has social and economic benefits for society as a whole.
- Educated women have more economic opportunities and engage more fully in public life.
- Women who are educated tend to have fewer and healthier children, and they are more likely to attend school.

- Education also increases the ability of women and girls to protect themselves against HIV and other forms of violence against them (UNFBA, 2009).

All of the above benefits are essential to breaking the cycle of poverty and discrimination against women and girls.

However, equality on enrollment of boys and girls in primary schools is closely being met in Asian countries especially on the eastern part such as, China, Republic of Korea, Japan and the South-eastern part such as Indonesia, Malaysia, Philippine, and Vietnam. Overview of gender in education sectors, particularly the representation of girls in basic education will give us picture about the progress of gender equality in basic education, as shown by the Report of the Millennium Development Goals - MDGs for 2008 (United Nations, 2008). The gap between female and male literacy is narrowing, compare to the world (82.4) and developing countries figure (77.1). Among the eleven Asian countries, the adult literacy ratio of female to male within 10 years (1995-2005) has improved above 0.90, except for India (0.65), Mongolia has achieved gender parity and only the Philippines who has exceeded gender parity ratio of adults female to male literacy (1.02), as shown in Figure 1.



Source : UNDP, HDR 2007/2008

Figure 1. Adult Literacy Ratio Of Female To Male, 1995–2005

Hermawati, et.al (2006) conducted a national study on gender in education in Indonesia. The results of the study has shown that ensuring girls entrance to and completion of primary school, requires serious efforts such as: provision of safe transportation to and from school, separate toilets for girls and boys, as well as the elimination of gender stereotyping in the classroom, which include gender stereotyped text books, teaching materials and teaching methods.

The Global Gender Gap Report 2008, published by the World Economic Forum (WEF), and the result of collaboration between the WEF and Harvard University and University of California, Berkeley presented the *Level of Gender Equality Achieved by*

Country, ranked by highest to lowest score in 2008. The score of Gender Equality achieved by this 11 (eleven) Asian countries vary and among the countries, the Philippines is the highest (0.7568) and India is the lowest (0.6060) as shown at Table 3. The score were calculated using several indicators namely economic participation and opportunity, political empowerment, educational attainment and health and survival.

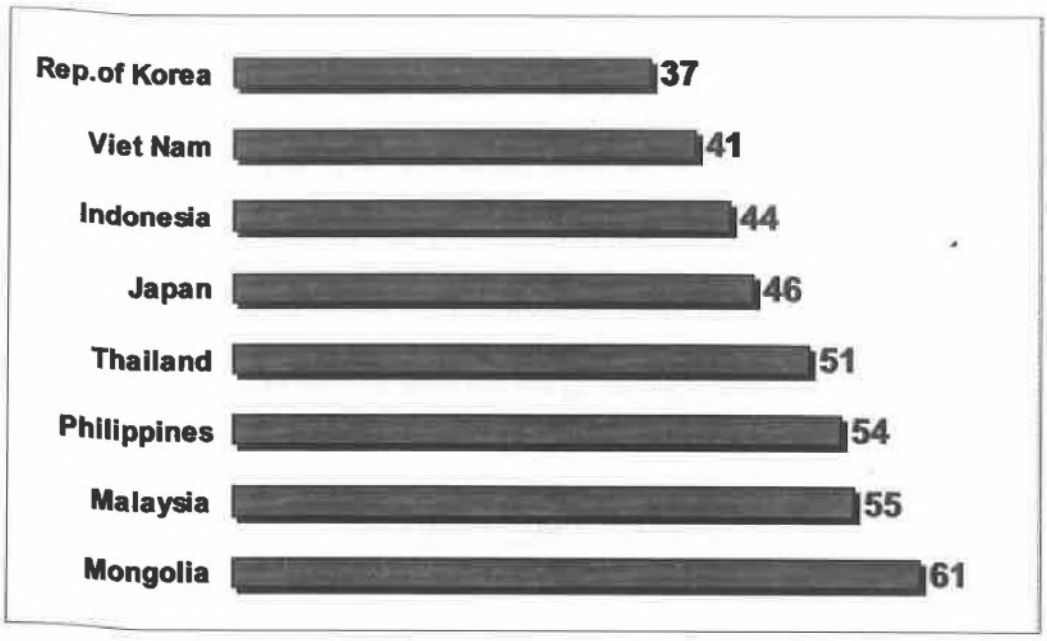
Table 3: Level of Gender Equality Achieved by 11 Asian Countries Ranked by Highest to Lowest Score in 2008

Country	Score	Rank
Philippines	0.7568	1
Mongolia	0.7049	2
Thailand	0.6917	3
China	0.6878	4
Vietnam	0.6778	5
Singapore	0.6625	6
Indonesia	0.6473	7
Malaysia	0.6442	8
Japan	0.6434	9
Rep of Korea	0.6154	10
India	0.6060	11
Norway	0.8239	The highest
Yemen	0.4664	The lowest

Source : World Economic Forum : The Global Gender Gap Index 2008 Rankings

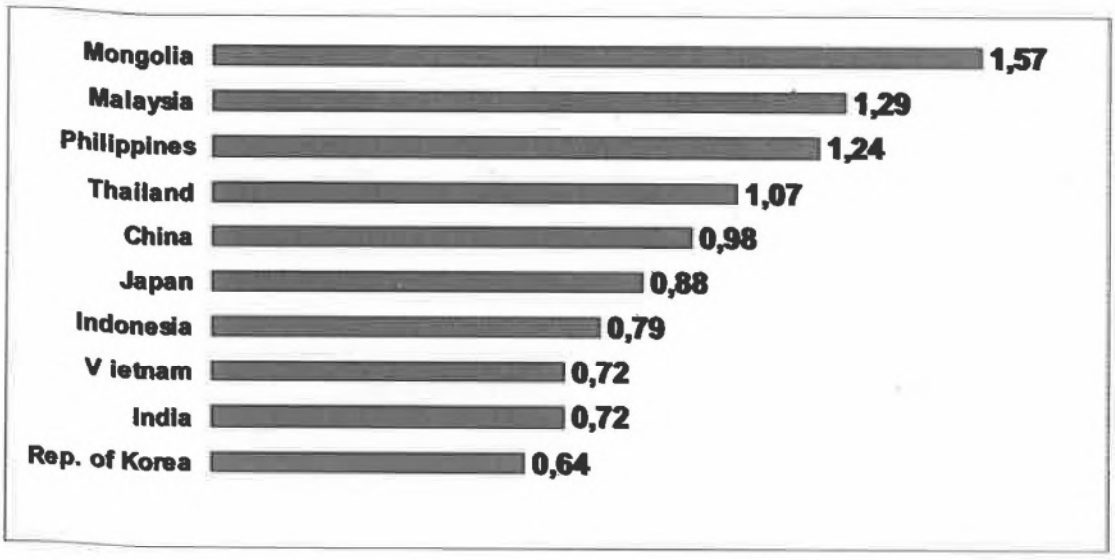
3.2 Women in Higher Education

The number of women entering tertiary education has also improved in many countries. Data taken from the Global Gender Gap Report 2008, shows that among the SCA member countries, Mongolia has the highest percentage of female enrolment at tertiary education (61%) and Republic of Korea has the lowest percentage (37%) as shown at Figure 2. Consequently the gender parity index in tertiary level enrollment of SCA member countries has also similar figure as shown at Figure 3.



Source : Global Education Digest, UIS Montreal, 2007
"Comparing education statistics across the world"

Figure 2: Percentage Of Women Enrolment At Tertiary Education, 2005



Source : WEF, Global Gender Gap Report, 2008

Figure 3: Gender Parity Index In Tertiary Education Enrolment In Several Asian Countries, 2008X

Due to the relative scarcity of the detail data and information on women in Science, Engineering and Technology (SET) education, the RESGEST (Regional Secretariat on Gender, Science and Technology) under UNESCO Office Jakarta, has undertaken a study on this subject in 2006 in 5 Asian countries, namely China, Indonesia, Philippines, Vietnam and Cambodia. Result of the study shows that only the Philippines has higher number of women enrollment in education. The Republic of Korea and Cambodia have less than 50% of their women student enrollment in S&T. Others have lower than 30% enrollment of women in engineering, as shown in Figure 4. Study from many countries also shows that women have different preferences from men in choosing their academic field. Women are more likely to enroll in humanities, arts and education, with social sciences. Natural science and engineering are the least favored fields in most countries (UNESCO, 2007).

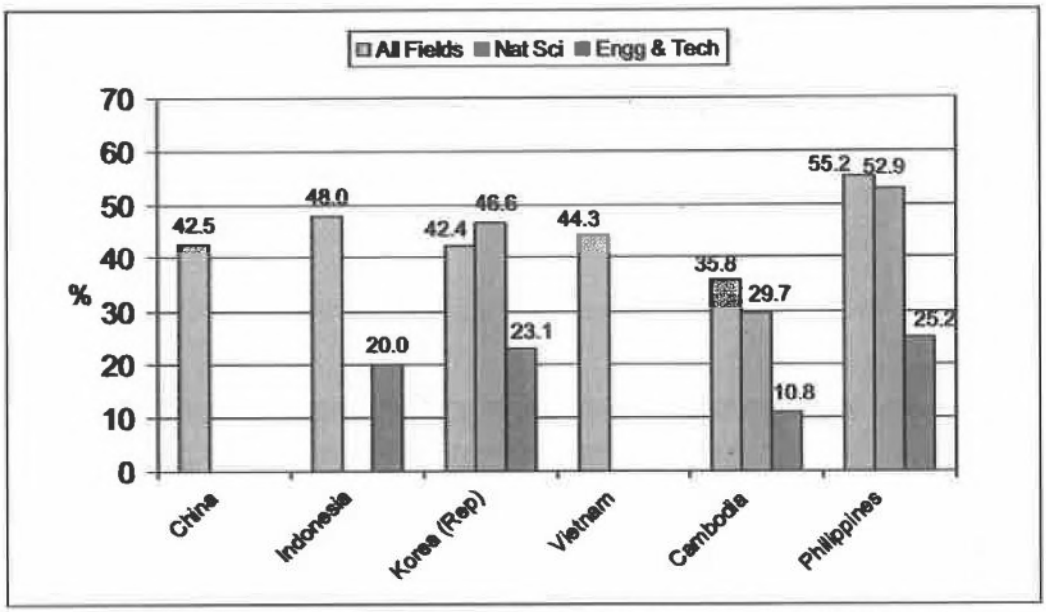
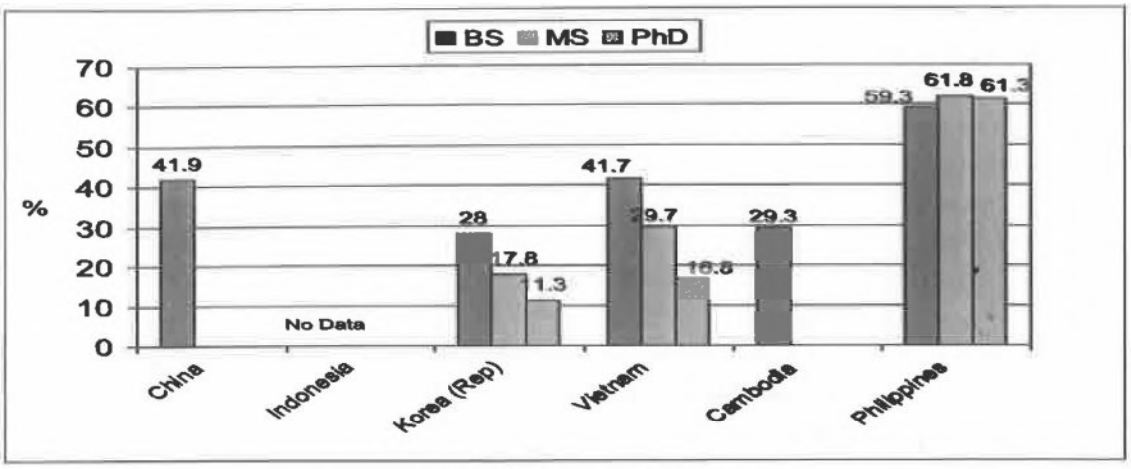


Figure 4. Percentage of Women Enrollment in Science and Technology, 2005

Note: All Fields include Natural Science, Engineering and Technology, Medical Sciences, Agriculture, Social Science and Humanities
Source: RESGEST Country Reports, 2005

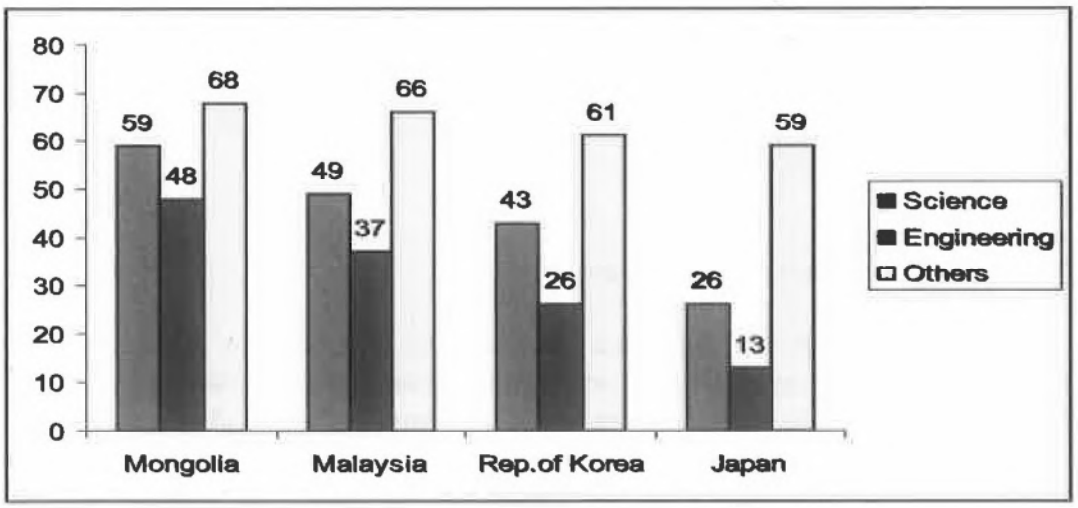
Available data from RESGEST's study (2006) shows that most of the member countries have number of women graduates below 50%. Only the Philippines registered graduates at BS, MS and Ph.D. levels that are higher than 50%, suggesting that more women than men obtained degrees at all three levels, as shown at Figure 5. The data from other countries suggest that much improvement is needed to allow women to enter various levels of the educational system.



Source RESGEST Country Reports, 2005

Figure 5: Percentage of Women Graduates in Higher Education, 2005

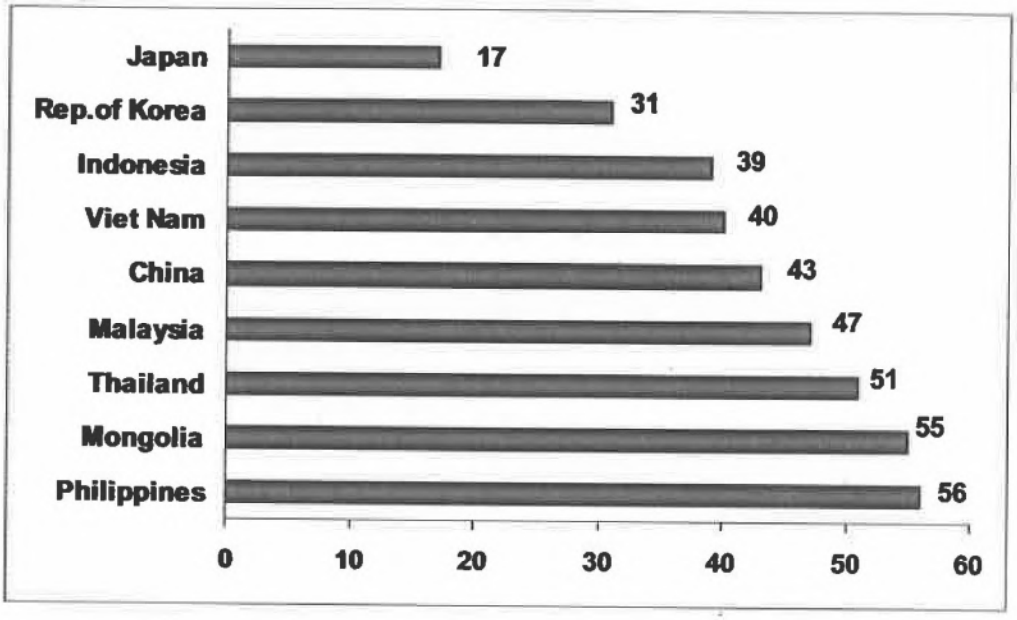
Many studies also shows that girl's science achievement levels frequently equal or exceed those of boys in early primary school, but they commonly drop in secondary and tertiary school (Rathgeber, et.al, 1995). This common phenomena also shows at Figure 6 which represents data for year 2005 on the percentage of women graduate in science, engineering and others including education. Out of the total number of graduates in each country, Mongolia has the highest percentage of female graduates in science and engineering compare to other countries.



Source : UIS, Global Education Digest, 2007

Figure 6: Percentage of Women Graduate by Field of Education (as a percentage of total), 2005

At all school level, decisions related to the learning and teaching process are made by head masters and teachers, and generally are dominated by male at all levels of schools. Since teachers constitute an important or key element in learning and teaching process, the maintenance of their quantity as well as quality should be given priority. Data on the percentage of female teaching staff at tertiary education of these countries in 2005 can be seen at Figure 7. There is a variation of data by country. The Philippines has the highest percentage of female teacher (56%) at tertiary education and the smallest number of female teacher was in Japan (17%).



Source : UIS, Global Education Digest, Montreal, 2007

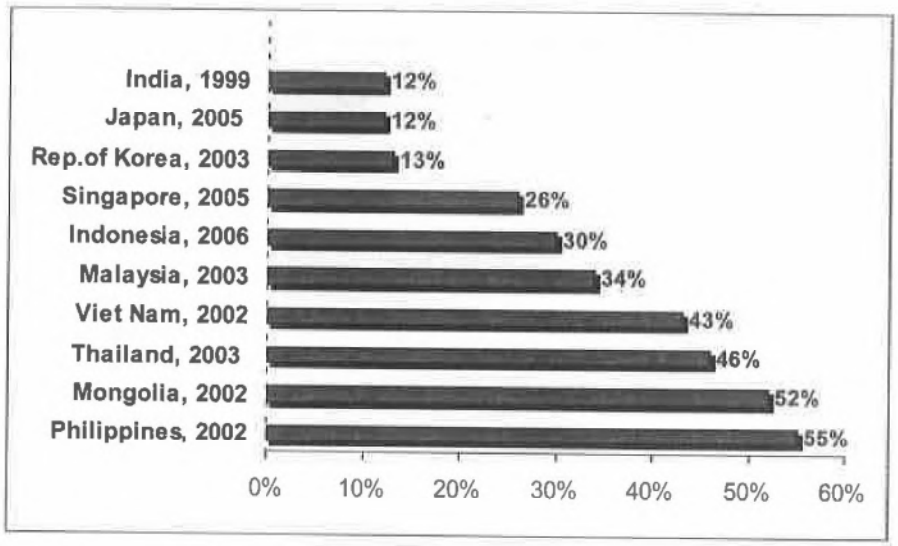
Figure 7: Percentage of WomenTeaching Staff at Tertiary Education of Several Asian Countries, 2005

3.3 Women In Research And Development

To a large extent, S&T and R&D activities are performed by the government, academe and private sector. UIS report (2006) estimates that women constitute only slightly more than one-quarter of the world's researchers, although there are many countries for which data are lacking, or data is not internationally comparable, such as in the case of China (UIS, 2006). In Asia, share of women in total number of researchers below the world average, only about 15% and at the regional level, the average vary, such as Central Asia with 50% and follow up with South East Asia 42%, exceeding the world average (27%). The smallest number was in South Asia, only 12% (UIS 2006). Among the Asian countries with available data, women researcher represents less than 15% in India, Japan and Rep. of Korea. Other countries represent moderate with 30% to

40% of researchers are women, except Mongolia and the Philippines (55%) have achieve gender parity leading to more women than men working in the S&T research field, as shown in Figure 8.

Overall, the under-representation of women in R&D activities should be traced back to education system, particularly at the higher level as well as socio-culture of the country. Although UIS (2007) has shown data on women participation in tertiary education has increased globally over the last decade, it remains weak in the most advanced degree.

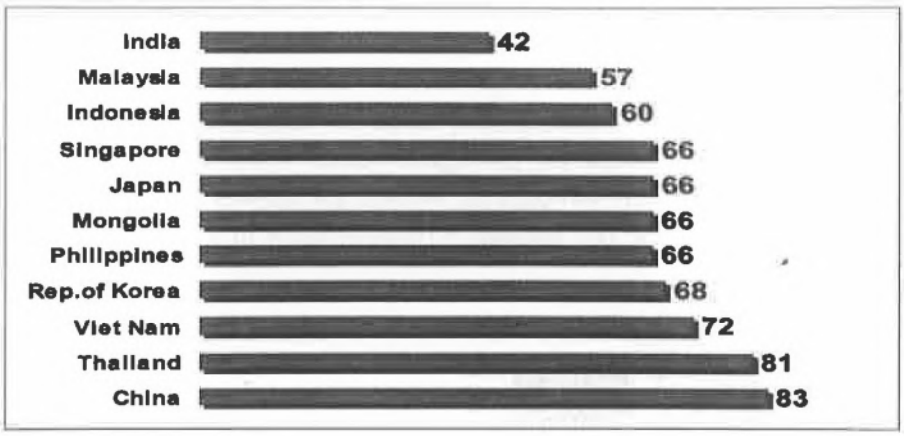


Source : UNESCO Institute for Statistics, February 2006

Figure 8 Share of women in total number of researchers (headcount)

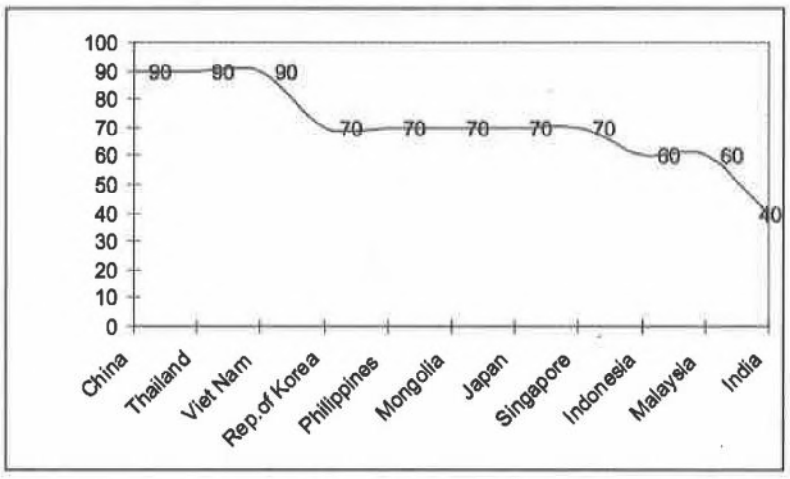
3.4 Women's Employment In The Economic Sector

The advancement of economic development can not be separated from the globalization era, which describes the change in all activities including global inter-connectivity. In order to engage women in the globalization process, government should facilitate the improvement of women's capacity and capability as well as ensure that economic and infrastructure policies of the country are gender responsive. Although data and information on the actual participation of women in socio-economic development and its impact on women's status are scarce, Figure 9 and 10 shows that among these countries, China and Thailand are the highest percentage of women engaged in economic activity compares to other country.



Source : HDR 2007/2008

Figure 9 Percentage of women economic activity (aged 15 and older) as % of men rate, 2005

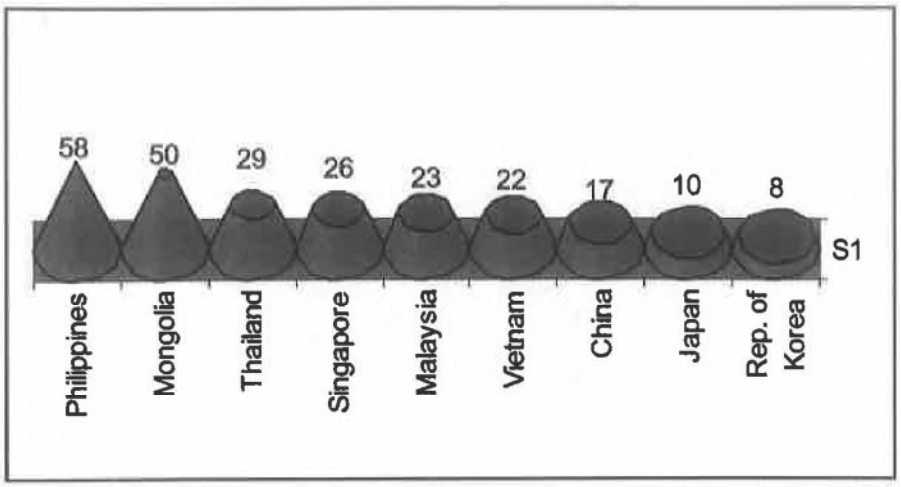


Source : ILO, Key indicators of the Labour Market 5th Ed (2006)

Figure 10: Women participation in the labour force as a percentage of men participation, 2006

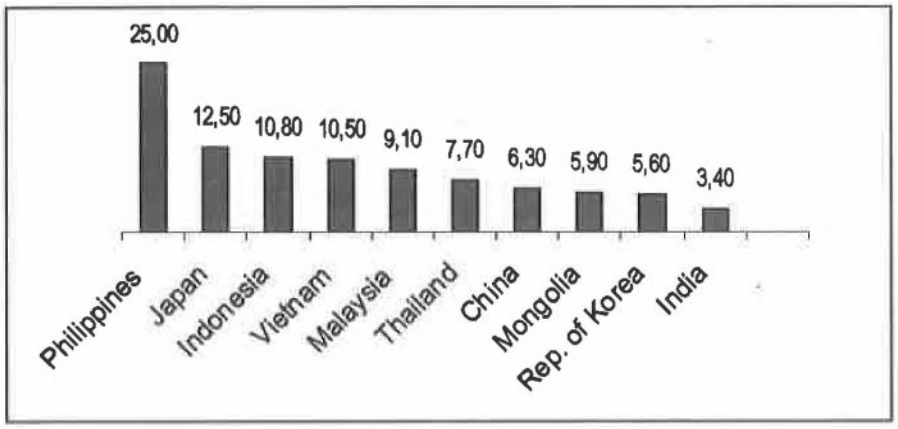
3.5 Women In S&T Decision-Making And Advisory Positions

Women are under-represented in leadership and decision making position in many Asian countries. This phenomenon is happening at all level and in all fields, locally, nationally and globally. To reveal the level of involvement of women in decision making at the national level, two sets of data are worth discussing. The first is female legislator, senior officials and managers (Figure 11) and women in government at ministerial level (Figure 12). Both figures shows that women have to make greater effort to achieve equality with men in terms of number and even more in terms of the quality of their participation, namely in policy and decision making positions. Only Philippines and Mongolia has achieved its parity. Similar situation also exists for women at Ministerial level or policy and decision making positions.



Source : UNDP, HDR 2007/2008

Figure 11 : Women legislator, senior official and managers as % of total (2005)



Source : UNDP -HDR 2007/2008

Figure 12 Percentage of women in government at ministerial level (2005)

In terms of women involvement as professional and technical workers, the Philippines, Mongolia, Thailand and China have the highest number as compared to other countries. The number of female professional and technical workers in those four countries is higher than male as shown in figure 13.

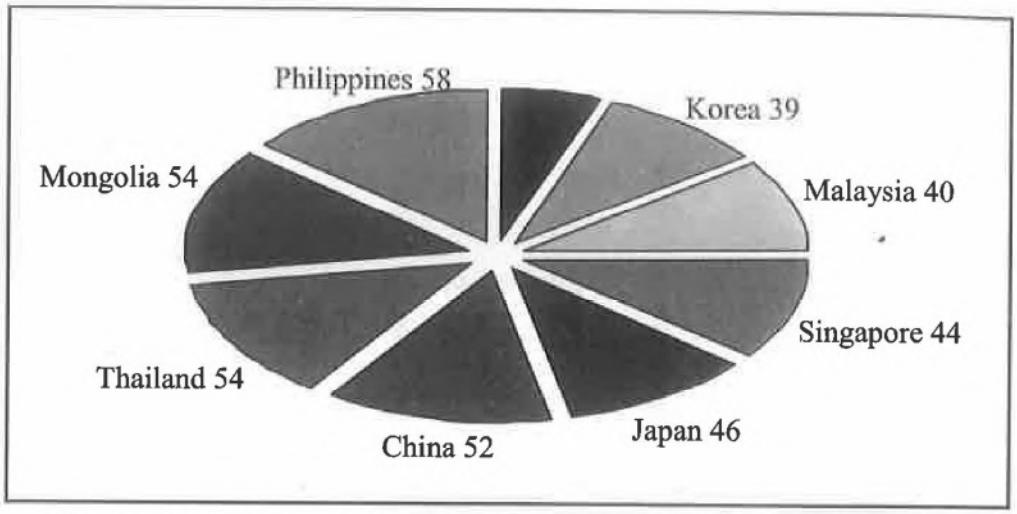
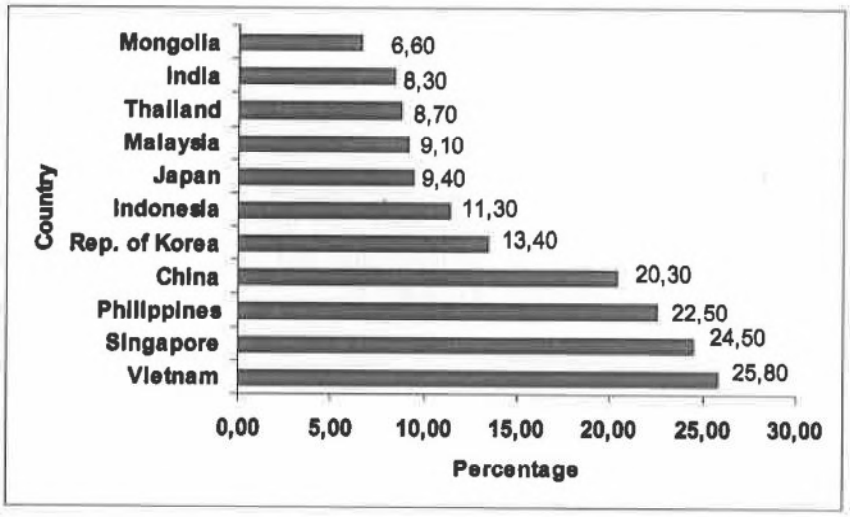


Figure 13 : Percentage of women professional and technical workers (% of total), 2005

Other data related to policy and decision making positions are data on seats in parliament held by women. Human Development Report (HDR) of 2007/2008 shows that only four countries, namely China, Philippines, Singapore and Vietnam have reached more than 20 percent. Therefore many of the countries in the world including some of the SCA member countries has applied a "temporary special measures" as stipulated in article 4.1 of the Commission on the Elimination of All Forms of Discriminations Against Women (CEDAW), to ensure that representation of women in parliament reaches at least 30% of the total number of the parliament members. Most countries especially State Parties of CEDAW (now reached about 187 countries member of United Nations) still have to make more effort to reach the consensus as shown at figure 14.



Source : HDR 2007/2008
Note : In 2009, Indonesia reaches 18%
Figure 14: Percentage of Seats in Parliament (lower house) held by Women, 2007

All data above demonstrate to us that women are not well represented in science, engineering and technology as students, researchers, decision makers, and professionals. Although, international statistics are difficult to provide as the collection of data varies from country to country, gender disaggregated data is really crucial for the identification of the status of women in S&T.

4. DISCUSSIONS ON THE CHALLENGES OF WOMEN'S PARTICIPATION IN S&T

Although there is no specific research on women in S&T in each countries, but there is more divergence of opinions on the reasons for lack of women's participation in S&T. Some reasons which exist in Asian countries are due to different situation, including cultural differences with their gender stereotyping values and attitudes that serve to discourage women and girls from studying science in schools and universities and leading more men than women in S&T careers and decision making. Other reasons are discrimination in educational institutions and work places, such as career interruptions due to childbirth and family responsibilities which condone inequality and inequity.

A study of gender parity in education in Indonesia found out that there are several reasons of low interest of women and girls in science, such as: poor science teaching in school and differential treatment from science teachers, there are strong social pressure against excellence in science because it is seen as "unfeminine"; science curricula designed to relate to the interest of boys rather than girls; lack of female role models of successful scientists. Since the sex role stereotyping in school text books continues to be significant, and girls are rarely depicted as active participants in science text book illustration (Hermawati, et al, 2006)

Other obstacles encountered by women in entering higher education are first, high cost for the family, second, they lost income they had before in the formal sector as well as their contribution to the domestic chores, which are essential for the survival of the family. Other reasons which affect parental decision to send their daughters to higher education are related to stereotyped cultural and religious values which actually manifested in the form of structural barriers to full participation of women in both education particularly higher education and opportunity to participate in the formal sector of the economy.

UNESCO (2003) shows detailed factors that were identified in many countries regarding the lower enrolment of girls in education, such as:

- Girls are often kept at home to help with domestic chores.
- Girls are conditioned not to pursue education because they are not expected to take up paid jobs outside of the home
- Early marriage and motherhood are still prevalent
- Armed conflict: girls are more vulnerable to rape, sexual violence and exploitation than boys.
- Poverty: girls and women are usually responsible for addressing the basic needs of the household, such as fetching water and gathering fuel-woods
- Economic and natural shocks including diseases: HIV/AIDS and poor health
- Violence and sexual harassment in schools.

In general, there are barriers for women scientist and technologist to fully participating in the working environment prevailing in S&T institutions, known as institutional barriers which from the way the institution is working, such as: fixed working hours, substantial attendance requirement, lack of child care facilities, as well as information about and opportunity to undertake skills or professional training.

Data gathered from selected RESGEST member countries disclose that each country has specific issues regarding problems of women's participation in science and technologies (RESGEST, 2006). *China, India, Indonesia, Korea and Vietnam* disclose that traditional culture and values do not support the participation of women in S&T. ***China*** identifies gender stereotyping as a serious factor hampering women's employment in S&T. Professions regarded ideal for women are teaching and nurses – both are considered services profession, rather than work in S&T fields. Although changes are taking place in the countries studied, overcoming gender stereotyping embedded in traditional culture and values, especially in the field of education and S&T obviously needs specific and serious attention and enhancement.

Women are also still under-represented in S& T decision-making and advisory positions in the countries studied, except for the *Philippines.* Lack of gender-responsive environment, limits provision for women's career development in science and technology. The implications of the absence of women in decision-making and advisory-positions in the S&T system are very significant as it marginalizes women in the decision making positions related to priority setting of national research areas and programs, allocation of research funding and to the design of research projects.

The lack of awareness, commitment and capacities among S&T policy and decision makers and the scientific community regarding the importance of implementating gender-mainstreaming in S&T, mostly due to the absence of sex-disaggregated data on the situation of women in S&T. Therefore, it is impossible to adequately reveal the actual situation of women especially gender inequality in S&T in the countries studied.

Therefore, it is not easy to "engender" S&T institutions, in terms of systematic collection and analysis of sex disaggregated data about all human resources involve, from decision makers, senior researcher down to the technician in the lab as well as research assistants. In addition, sex disaggregated data about S&T actors as well as information about impact of S&T development and applications on both men and women are essential for the formulation of the S&T policies, programs and projects which are responsive to the different needs and concerns of women and men.

5. ACTIONS TAKEN BY THE GOVERNMENT TO PROMOTE WOMEN'S EMPOWERMENT AND GENDER EQUALITY

To improve the status of women as well as to achieve gender equality in all spheres of life, many governments provided their various strategic actions, such as women's empowerment programs. Women's empowerment through S&T has the potential to enable them to realize their potential and shape their life in accordance with their aspirations, and also to strengthen the advancement of S&T and the role of S&T in wealth accumulation (Oldham, 2000). One direct way of addressing the problem of women's exclusion from S&T education, R&D activities, and decision making positions,

is by taking "temporary special measures" mandated to all state parties of the CEDAW covention (Para 4.1), publicly known as "Affirmative Action". RESGET (2004) reported that several countries in Asia, such as the China, India, Indonesia, Republic of Korea, the Philippines and Vietnam have taken Affirmative and Strategic Actions, not only to ensure but also to speed up the attainment of gender equality and equtiy in S&T development and application.

In **China,** strategic actions stipulated in the Program II of the Development of Chinese Women (2001-2010) are implemented with focus on the enhancement of (a) the participation of women in educational attainment in S&T, (b) the participation of women in decision-making and advisory positions in S&T, (c) the expertise of women scientists and engineers, and (d) the empowerment of women's skills in S&T implementation. To enable the "visibility" of women's participation in S&T, and enhance the awareness of gender mainstreaming in S&T, CAST (China Association of Science and Technology) added 4 indicators in the annual statistics. The statistics and indicators are related to (i) female employed personnel, (ii) women in science and technology, (iii) female directors, and (iv) female individual members in various S&T associations at different levels, and 168 national academic and professional societies. Other efforts in promoting women's involvement in S&T including giving awards for China Youth Women Scientists, scientist on TV program, establishment of All-China Women Federation, and initiative on women's studies at higher education.

In India, based on the directions stipulated in the Sixth Five-Year Development Plan (1980-1985), strategic action is taken and implemented since 1981 by the Department of Science and Technology through initiation of the scheme "Science and Technology for Women". Within the scheme, projects are being supported and implemented, which aimed at the application of science and technology for the benefit of women, especially in rural areas.

In Indonesia, a Presidential Instruction No 9/2000 makes it mandatory for all government stitutions to do gender mainstreaming in their activities. Another Presidential Instruction No. 4/2003 on the Coordination of Strategic Policy Formulation and Implementation of the National Development of Science and Technology was issued. The strategic policy specifically stated that *"national development in the field of science and technology also needs to be implemented with gender perspective, in line with international efforts to achieve gender equality".* The strategic policy also stated that (a) science and technology development's support is enhanced in order to strengthen socio political order, including gender equality, (b) studies to be carried out on the weaknesses of institutional structure which need to be overcome immediately in order to reduce impact of socio political gap and provide support to gender equality through harmonious atmosphere in order to continuously strengthen the basis for social solidarity.

To effectively implement the strategy, a National Committee on Gender, Science and Technology was established in 2004. The primary task of the Committee is to develop a synergy and network with all stakeholders in order to achieve gender equality and justice in the development, mastery and benefit of science and technology. Other efforts include the establishment of Women's Studies Research and Graduate Program, Gender Study Center within universities and Women Scientist Awards. Although the government has made strong efforts in mainstreaming gender in S&T related Policy, other policies

which is not directly related to S&T still lack of gender perspective, such as in the case of Married Law in Indonesia.

In Republic of Korea, the establishment of the Ministry of Gender Equality in 2001 and the promulgation of the Law for Women in Science and Technology in 2002 prompted the Ministry for Science and Technology (MOST), the Ministry of Gender Equity (MOGE) and the Ministry of Education (MOE) to develop programs to support women in S&T. MOST provides scholarships for girls to study S&T and provides research grants for women in S&T. In 2002 MOST set up an "Employment quota for women in S&T". The goal is to have 10% of women in government institutions, and public and private universities. MOE provides scholarships for female students in S&T, and "Employment quota for female professors". Through this employment quota 200 female professors were newly employed in 4-year colleges. The respective ministries also have other programs to support women in S&T. MOST provides "Starting funds for newly employed female researchers", "Women scientists and engineers of the year award", "Grants for expansion of Women's University Research Foundation". To enable the "visibility" of women scientists and engineers, MOST supported the Association of Korean Women Scientists and Engineers (KWSE) to establish a database on women scientists and engineers in Korea. In June 2003 KWSE established data of 6.600 women scientists and engineers.

The Philippines issued the "Women in Development and Nation Building Act" as a powerful instrument that advances gender equality in all spheres of activity. For example, the Philippines annual budget law sets aside funds for gender programs. The Civil Service Commission of the Philippines enhances career opportunities of women in government services. The Science Education Institute of the Department of Science and Technology provides scholarship programs for science, science teaching, engineering, three-year or two-year technical courses for students who completed their secondary education. The mass-based scholarship program benefits students who compete in a national examination.

Based on the directions of the Plan for Gender-Responsive Development (PPGD) 1995-2025, the Department of Science and Technology (DOST) implement strategic actions related to (1) DOST's participation in gender-responsive activities and the establishment of DOST's Focal Point for Women's Concerns, (2) the creation of a Committee on Women's Concern in each DOST agency and the collection and documentation of gender disaggregated database for planning, policy and training, (3) the creation of a Technical Working Group (TWG) to formulate DOST-wide Gender and Development Plan. The specific objectives are: (a) to integrate the gender perspective in the development process of the Department, (b) to institutionalize gender-responsive programs and projects, (c) to develop/enhance capability-building, training programs and activities on GAD, and (d) to develop and institute gender responsive database and information material. In 2002 there was a Memorandum Order signed by President Gloria M. Aroyo, directing the Secretary of DOST to coordinate and oversee the implementation of a comprehensive Philippine Platform of Action on gender, science and technology.

In **Vietnam,** the overall objective of the National Strategy for the Advancement of Women by 2010 is the improvement of women's quality and exerts their fundamental rights to fully and equally participate in and benefit in all aspects of political, economic, cultural and social life, including S&T.

5. SUMMARY

Challenges related to women in S&T as well as gender equality and equity in S&T are very similar in many countries. Although progress has been made, more efforts are still needed to bring gender equality and equity in S&T into reality in all fields and at all levels. Several realities are to be addressed by all of us, but more specifically by the government and the scientific community in the realization of gender equality and equity in S&T. Among others they are as follows:

1. Lack of comprehensive sex-disaggregated data and gender indicators in S&T which can give insight on key issues on women in S&T. Sex disaggregated data and gender indicators are key instruments for gender mainstreaming in S&T policies and programs.
2. Issues emerging from the sex disaggregated data and analysis have not been successful in changing the traditional gender stereotyped attitude towards women in S&T, particularly among S&T decision makers.
3. In order to ensure full and equal participation of women in S&T as a means to maximize women's contribution to S&T development and application and to HCSD all government must ensure that all public policy be gender responsive.
4. Women full and equal participation in S&T should no longer be looked at only from the perspective of gender equality goals but as an essential means for sustainable economic growth and equity. Therefore, in the formulation of S & T policy one should address the inherent and strong gender biases in this field.
5. Government as well as the scientific community are responsible for the creation of an appropriate policy environment which facilitate women's full and equal participation in S&T as well as in the enjoyment of the benefit of S&T development and application.

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