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SANEM Thinking Aloud

Editor's Desk

The theme of May 1, 2016 issue of Thinking Aloud is "Productivity". The article on "Why do countries differ in total factor productivity?" argues that Total Factor Productivity (TFP) plays a key role in economic fluctuations, economic growth and cross-country differences in per capita income. The article uses cross-country panel regressions for 110 countries for the period 1995-2011 and the analysis reveals that, in order to increase the TFP, countries like Bangladesh need to improve their current low levels of human capital by enhancing investment on education and health. Also, larger trade and FDI orientations and improvement in the quality of institutions are indispensably important. The second article on "Does export orientation lead to higher productivity? Firm-level evidence from Bangladesh" explores how export orientation affects firm-level productivity by looking at the range of determinants of productivity of manufacturing firms in Bangladesh. The regression analysis reveals that after controlling for firm size, firm age, firm's output share in the industry and access to IT services, exporting firms in Bangladesh were more productive than non-exporting ones by 156% in 2007 and by 112% in 2013. This is due to several reasons including exposure to competition in international market, technical support from external buyers, efficiency gained from exporting etc. Third page includes an in-depth interview of Dr. Bazlul Haque Khondker where he talks about productivity, growth and sustainable economic development in the context of Bangladesh. In his interview, Dr. Khondker discusses that without adequate investment in education and health sectors and quality of service delivery, it is difficult to raise productivity. The fourth page of current issue highlights SANEM events that took place in the month of April.

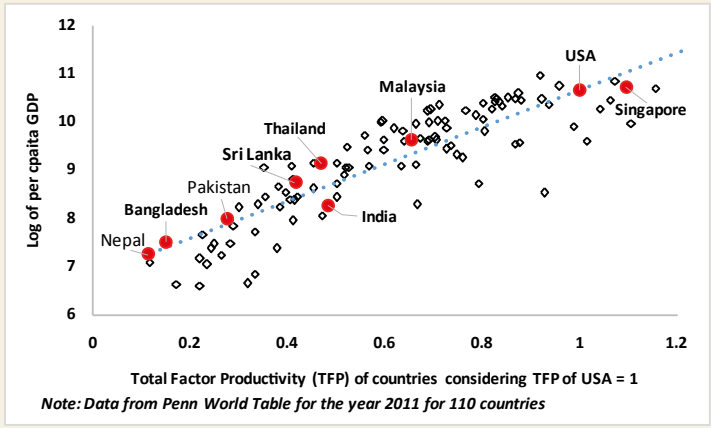
Inside this issue

Why do countries differ in total factor productivity?

Selim Raihan

Theoretical and empirical literatures on sources of economic growth emphasized on factor accumulation and factor productivity as two major sources of growth. Though factor accumulation can explain a significant part of economic growth, it can't explain the sustained long run economic growth, as sustained long run economic growth is attributable to growth in productivity. Productivity is the cornerstone of economic growth. Increases in productivity allow firms to produce greater output for the same level of input, and thus result in higher Gross Domestic Product (GDP).

We should make clear the difference between labor productivity, which is output per worker, and Total Factor Productivity (TFP), which is the 'ability' with which all factors are combined to produce outputs. TFP is the part of output which is not explained by the amount of inputs used in production. Essentially, its level is determined by how efficiently and intensely the inputs are used in the production process. TFP growth is usually measured by the Solow residual. TFP plays a key role in economic fluctuations, economic growth and cross-country differences in per capita income.



Note: Data from Penn World Table for the year 2011 for 110 countries

The scatter-plot using the data for 110 countries in 2011 shows a very interesting association between TFP and log of per capita GDP. The TFP data are derived from the Penn World Table version 8.1 (PWT 8.1) with some required adjustments and extensions. Here the TFP level of USA is considered as 1 and other countries' TFP levels are indexed against USA's TFP level. For example, among the South Asian countries, the TFP levels of Bangladesh, India, Nepal, Pakistan and Sri Lanka in 2011 were 0.15, 0.48, 0.11, 0.28 and 0.42 respectively. Similarly, TFP levels of Malaysia and Thailand were 0.65 and 0.47 respectively. Singapore's TFP level (1.1) was higher than that of USA. The trend line shows a very strong positive association between TFP and log of per capita GDP (the correlation coefficient is 0.9). Nepal and Bangladesh, though on the trend line, are at the lower end of the association. A straightforward policy suggestion for these countries is that a rise in the TFP level is required to raise their per capita GDPs.

Why do countries differ in TFP? How to improve the level of TFP? In order to answer these questions, we have run fixed effect cross-country panel regressions for 110 countries for the period 1995-2011 considering log of TFP as the dependent variable. The explanatory variables include log of human capital (an index of human capital per person which is linked to the average years of schooling and the return to education), log of public expenditure on health as % of GDP, and log of trade-GDP ratio. The data source of human capital is the PWT 8.1, and the data of health expenditure and trade-GDP ratio are taken from the World Bank WDI. The logic behind the formulation of this model is that we want to explore how cross-country differences in statuses of education, health and openness affect the cross-country differences in the TFP. The regression results suggest that all three explanatory variables are statistically significant with expected signs. One percent rise in the human capital index is associated with 0.39% rise in the TFP. Also, 1% rise in the ratio of public health expenditure to GDP is associated with 0.03% rise in the TFP. Finally, 1% rise in the trade-GDP ratio is associated with 0.03% rise in the TFP.

In extended models, we have found that the ratio of FDI to GDP is positively and significantly associated with the TFP. One percent increase in the FDI-GDP ratio is associated with 0.01% rise in the TFP. Furthermore, institutional variables like bureaucracy quality and investment profile (from the PRS database) are positively associated with the TFP with statistical significance. Improvements in the bureaucracy quality and investment profile by one unit are associated with rise in TFP by 0.03% and 0.01% respectively.

The aforementioned analyses suggests that countries like Bangladesh need to attach decisive emphasis on improving their currently low levels of human capital. This can happen by enhancing investment on education and health quite a lot in order to increase the efficiency in using inputs in the production process thus raising the level of TFP. Also, larger trade and FDI orientations and improvement in the quality of institutions are indispensably important.

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Does export orientation lead to higher productivity? Firm-level evidence from Bangladesh

Selim Raihan, Nafiz Ifteakhar and Mir Tanzim Nur Angkur

For long, empirical studies on the role of exports in promoting growth in general, and productivity in particular, used data at the country or industry level to test whether exports promote productivity growth or vice versa. However, a series of empirical studies since early 1990s started using firm level data to look at differences between exporters and non-exporters in various dimensions of firm performance, including productivity.

Two alternative but not mutually exclusive hypotheses can be mentioned why exporting firms can be expected to be more productive than non-exporting firms. The first one relates to the fact that firms which are considered to be more productive than others are likely to participate in export markets – the so called 'self-selection' of the more productive firms into export markets. The second one relates to the notion of 'learning by exporting' hypothesis which suggests that after entering the export market, firms are able to acquire new knowledge and adopt new expertise which eventually leads to higher level of productivity. Though there is sizeable evidence that exporters perform better than non-exporters, the issue of the direction of the causality between exports and productivity is still debated. While in the contexts of more advanced countries most studies find evidence that the export premium is due to a self-selection process, a number of recent studies on less developed countries tend to endorse the learning effect.

Against this backdrop, this paper explores how export orientation affects firm-level productivity by looking at the range of determinants of productivity of manufacturing firms in Bangladesh. Review of empirical studies suggest that there could be several factors, i.e. firm size, firm age, share of firm's output in the industry, export orientation measured as percentage of total firm's output that is exported, which may affect firm's productivity. Our measure of firm's productivity is the total factor productivity (TFP) which is derived using the Cobb-Douglas production function framework. Specifically, we have regressed log of output (calculated as total sales of firms) on log of capital (measured as netbook value of fixed assets of the firms) and log of labor (measured as total number of employees) to get the output elasticity of capital and labor which are then used to estimate the total factor productivity (TFP). To get unbiased estimates of those elasticities in the presence of industry fixed effects, we have included industry dummies in the above regression. We have used the dataset of "*The World Bank, Enterprise Survey-Bangladesh" for 2007 and 2013* and have only considered firms belonging to the manufacturing sector. Table 1 shows the industry descriptions along with the distribution of firms for both 2007 and 2013. We have estimated TFPs of firms separately for 2007 and 2013 by following the same procedure described above.

Table 1: Distribution of firms in the survey by industry classification

Industry description	2007 (%)	2013 (%)
Food	18.04	13.8
Garments	19.98	16.77
Leather	19.69	8.98
Textiles	10.18	10.07
Machinery & equipment	5.92	2.2
Chemicals	12.61	9.99
Electronics/electrical	5.82	1.61
Non-metallic minerals	0	5.93
Other manufacturing	7.76	30.65
Total	100.00	100.00

Source: World Bank, Enterprise Survey, Bangladesh

In order to explore the effect of export orientation on the productivity of firms we have run cross-section regressions for 2007 and 2013. For both years we used the same model and Table 2 shows the estimated results. The dependent variable of our model is total factor productivity. The main explanatory variable is the export orientation while the set of control variables include firm size, firm age, firms' output share and internet connection. In the regression models, export orientation of the firm is represented by a dummy variable, where the dummy variable takes the value of 1 if the firm exports 25% or more of its total output.

For firm size, we have also taken three dummies- large, medium and small based on the number of employees. For capturing the effect of technology on productivity, we have taken internet connection dummy. Internet connection dummy will take the value of 1 if the firm communicates by e-mail.

Table 2: Effect of export orientation on firms' Total Factor Productivity (TFP)

Independent Variables	2007	2013
	Coeff (S.E.)	Coeff (S.E.)
Firm age	0.01*** (0.00)	-0.002 (0.003)
Medium size	-0.89*** (0.17)	-1.43*** (0.15)
Small size	-1.70*** (0.17)	-2.57*** (0.18)
Output share in industry	0.31*** (0.08)	0.12*** (0.03)
Internet connection	1.17*** (0.14)	1.08*** (0.15)
Export orientation dummy	0.94*** (0.12)	0.75*** (0.14)
Constant	16.19*** (0.18)	17.55*** (0.17)
Number of observations	840	863
F	382.37	231.64
R-square	0.727	0.628

Note: *** p<0.01, ** p<0.05, * p<0.1

The cross section regression result of 2007 suggests that firm age has positive and significant effect on productivity, while the result of 2013 indicates no such relationship. For 2007, it is estimated that an increase in firm age by one year would lead to a rise in productivity by 1%. For both years, firm size has an effect on productivity. In particular, both medium and small sized firms tend to be less productive than large firms. The firm's output share is found to have a positive and significant effect on productivity for both 2007 and 2013 respectively. For 2007, one percentage point increase in firm's output share would lead to a rise in firm's productivity by 31%, while for 2013 such productivity rise would be by 12%. Now considering the effect of internet connection on productivity, firms with internet connections are found to be more productive than firms with no internet connection for both 2007 and 2013.

Our variable of interest is the export orientation which is found to have a positive and significant effect on productivity for 2007 and 2013. For 2007, we have found that on average productivity of a firm that exported 25% or more of its output was 156% higher than a firm that exported less than 25% of its total output. Such productivity difference was however reduced in 2013, as productivity of a firm that exported 25% or more of its output was 112% higher than a firm that exported less than 25% of its total output.

From the aforementioned analysis, it can be said that larger firms are more productive as compared to small and medium sized firms. Larger firms, due to economies of scale, are able to reap some benefits which help them to utilize resources more efficiently. Firms which started earlier in an industry also tend to be more productive than firms which entered in the industry later. This is due to the fact that already established firms have advantages over new firms in case of production, marketing, etc.

Also output share of the firm belonging to an industry (measured by the proportion of sales of firms in total industry sales) may influence the firm's productivity. Firms with higher output share can positively affect productivity, as dominant firms hold the necessary resources and technical skill and expertise as compared to firms with low output share. It is also found that firms which have access to internet connections can benefit from lower communication cost and can also communicate with its clients and suppliers timely and thus leads to higher productivity.

Finally, the regression results confirmed that the exporting firms in Bangladesh are more productive than their counterparts. There could be several reasons for this. The learning process may work through technical supports from external buyers, and/or through the exposure to competition in the international markets, which can result in knowledge, technology, and efficiency gain from exporting.

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"...allocate more resources in education and health to improve productivity..."

SANEM Interviews Dr. Bazlul Haque Khondker on productivity, growth and sustainable economic development. Dr. Khondker is a Professor at the Department of Economics, University of Dhaka and the Chairman of South Asian Network on Economic Modeling (SANEM). His areas of expertise include construction of technical framework for the Five Year Plan of Bangladesh, assessing resource gaps implications of various investment intervention (including MDGs) using consistent Macroeconomic Framework, construction of Social Accounting Matrices (SAM), and analysis of poverty and income distribution impacts of trade and tax policy reforms using static as well as dynamic Computable General Equilibrium models. Dr. Khondker was involved in designing and implementing a 'Generalized Macro Economic' framework on behalf of UN Regional Bureau for the Asia and Pacific (UN RBAP) which has been used in Mongolia and Nigeria to develop their MDG financing strategies.

SANEM: Why productivity is so important for growth and sustainable economic development?

BHK: Bangladesh aims to attain the status of higher income country by 2040 focusing on high and sustained economic growth in the vicinity of 7-8 percent. Following the stellar example of the East Asian country, Bangladesh intends to pursue a growth strategy primarily focusing on manufacturing export and modern service sector. The country expects to double manufacturing contribution to GDP from the current level of around 20 percent.

The question is – how are we going to achieve this? I think along with deepening of capital (capital accumulation) and expansion of labor force, productivity will need to place an important role in this pursuit. Theory and empirical evidence envisaged that the most important growth drivers are: capital accumulation, expanding labor force along with their quality and the growth of total factor productivity (TFP). In the case of Bangladesh, empirical evidence concluded limited role of TFP and dominant contribution of capital accumulation. Furthermore, use of growth accounting found that the expansion of labor force and investment in human capital have also contributed to growth. As mentioned above, the contribution of TFP on growth has not been significant so far, but there are signs that TFP contribution has improved appreciably during 2001-12.

Given the Incremental Capital Output Ratio (ICOR) of about 4.5, it would require an investment of 40-50% of GDP to achieve 7-8% growth rate. Sixth Five Year Plan aimed to add 5 percentage points additional investment on the base rate of about 26% (i.e. investment-GDP ratio found in 2010 – base year of the Sixth Plan). In reality, the economy could only add 1 percentage-point additional investment during the Sixth Five Year Plan. Thus, the investment target to achieve 7-8% growth appears to be very ambitious unless we would somehow be able to attract large FDI – an area where our track record is very poor. Thus, productivity growth must play a central role in the coming decades to attain high growth rates. However, this would require much higher investment in social sector, investment in R&D, installation of efficient and modern production system (including agriculture), ensuring smooth and efficient transportation and logistics - all of which would also help improve environment in Bangladesh.

SANEM: How can productivity enhancement help reaping benefits of demographic dividend for a country like Bangladesh?

BHK: Demographic transition captures the movement of a society from an equilibrium portrayed by high fertility and high mortality, to one depicted by low fertility and low mortality. Bangladesh is a populous country and has been experiencing significant changes in her demographic structure. The demographic transition can enhance economic growth in two broad ways. *First*, as the dependency ratios decline and the share of working age population grows relative to the total population, the average number of children per working age adult also falls. Assuming, this is associated with a freeing up of resources that previously would have been consumed by additional children -allowing living standards to rise. This is the first demographic dividend. *Second,* a second dividend results in when the faster growth of first dividend leads to larger savings in the short run and higher investment in the human capital and investment per worker in the long run.

In other words, the first demographic dividend is defined as the contribution of age structure to economic growth, precisely the per capita income or the per capita consumption, and it is measured as the positive growth of the economic support ratio. The first demographic dividend measures the effects of changes in age structure on consumption per equivalent adult holding the consumption rate and output per worker constant. Empirical evidence suggests that Bangladesh has entered first demographic dividend in early 1990s which will continue to a point somewhere between 2030 and 2040.

An important growth driver is expanding labor force along with their quality. Looking at the labor market characteristics in Bangladesh – we found two distinct trends: (i) per annum average growth of the labor force has been 2.9% between 1974 and 2010, while the population growth rate has been 2.1%. The faster expansion of the labor force is caused by rising share of population in the working age group of 15 plus and increasing participation of female workforce. However, the level of female participation (only 36% in 2010) remains low by international standards; (ii) Quality of labor force has remained poor – around 40% of the workforce had no education and 23% had only primary level education in 2010. These indicators are indicative of a very low skilled workforce.

Thus it is clear that addressing the skills gap must be a top most priority for reaping the maximum benefit of the first demographic dividend. Investment in education, training and human development must be raised from current 2 percent level to about 4 percent. Vocational training and skills development should get priority and adequate allocation. Moreover, higher investment (i.e. 3-4 percentage points higher) is needed for creating employment for new entrants. We must also adopt strategies to enhance female labor force participation including greater opportunities for wage employment and self-employment.

SANEM: What are the major obstacles and challenges for Bangladesh on its way towards productivity enhancement?

BHK: We are not investing enough in sectors those have close linkages with increasing productivity. It is widely believed that without adequate investment in education and health (including nutrition) sectors and quality of service delivery, it is difficult to raise productivity. However, data suggests that investment in these two sectors has historically been low in Bangladesh. More specifically, allocation to health sector as percentage of GDP has remained stable at around 0.8 between 2009 and 2014. Allocation to the education sector is higher than the health sector and has remained stable at around 2 percent of GDP over the same period. These figures compare poorly with social sector allocations found in other countries. For instance, allocations to education and health sector in Malaysia as percentage of GDP in 2011 were 5.9 and 4 respectively. The corresponding figures for Thailand were 5.8 and 4.6 respectively. In the case of India, the corresponding figures were 3.9 and 4 respectively. Bangladesh needs to find out a way to allocate more resources in education and health sectors. In addition, attention must be given to improve quality of services.

SANEM: What action should be taken in Bangladesh for productivity improvement?

BHK: TFP growth measures the improved efficiency of all inputs, factors (i.e. capital and labor), and technology which are used in the production process. TFP is an endogenous variable and is influenced by government policies. The top most important policy is to ensure investment in research and development. Spending on research and development (R&D) is a major determinant of technology development, innovation and adoption of technological change. Thus, spending on R&D should be increased about 1% of GDP. Seventh Five Year Plan also advocated for increasing proportion of primary government schools with a computer laboratory; improving tele-density to 100% and expanding Broad Band Coverage to 35%.

Government should also pursue an aggressive FDI inflow strategy since it is an important conduit to enhance technical know-how (i.e. latest equipment and management skills) of a country.

Furthermore, there is also sufficient international evidence that stronger institutions help improve total factor productivity. Thus, Bangladesh needs to pay greater attention in this area.

SANEM: Thank you so much for your time.

BHK: My pleasure.

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Capacity building workshop in Ulaanbaatar, Mongolia

In collaboration with GIZ Germany, ARTNeT and SANEM, a capacity building workshop on "Gravity Modelling for Trade Policy Analysis" was held during 19-21 April 2016 in Ulaanbaatar, Mongolia. This workshop provided the participants a solid understanding of the gravity model of bilateral trade, practical skills in applying basic gravity econometrics and an appreciation of data and estimation issues involved in the use of gravity models in a range of applied trade policy topics. The structure of the workshop alternated between presentations by the trainer and "hands on" exercises in which participants were invited to explore concrete

applications using real data. The workshop facilitators included Dr. Witada Anukoonwattaka (ESCAP/ARTNeT) and Dr. Selim Raihan (Executive Director, SANEM). Opening remarks were provided by GIZ representative. Dr. Selim Raihan facilitated the sessions titled "Using Stata to estimate the basic gravity model" and "Briefing on advance issues". Other sessions included "Introduction to tools for evidence-based trade policy formulation", "Introduction to using gravity models for trade analysis", "The benchmark model", "Approaches for dealing with policy variables", "Briefing on advance issues" and "Consolidation and group exercises".

Dr. Khondker visited Rabat, Morocco

Recently, the Government of Morocco has been planning to expand the affordable housing assistance programs with an aim to improving efficiency and equity. Thus, the government has undertaken an in-depth evaluation of the housing sector assistance project to evaluate the merits and demerits of the program with technical support from the World Bank. Dr. Bazlul Haque Khondker (Chairman, SANEM) has been working as an Economist in this study. In connection to this study, Dr. Khondker recently visited Rabat, Morocco between March 26 and April 8, 2016. During his visit, Dr. Khondker met several government officials, members of development partners and other stakeholders of the program.

12th SAESM held in Colombo, Sri Lanka

The 12th South Asian Economics Students Meet (SAESM) was held during 3-6 April, 2016 at Bandaranaike Memorial International Conference Hall, Colombo, Sri Lanka. Welcome speech was provided by Mr. Sajith De Silva (3rd Year Economics Student, University of Colombo) and the Chief Guest was Ms. Françoise Clottes (Country Director for Sri Lanka and the Maldives, the World Bank). This year's theme was "South Asia in the Asian Century". Apart from six thematic sessions, the program included Budding Economist Contests and Economics Quiz Competitions. Coordinated by Dr. Sayema Haque Bidisha (Associate Professor of Economics, University of Dhaka) and Mr. Jafar Emran (Lecturer, Department of Economics, University of Dhaka), a team of 10 students from University of Dhaka participated in SAESM. Bangladesh team won 4 out of 9 prizes among all South Asian countries including the "Budding Economist" award, economics quiz competition and two best paper awards in two different categories. From SANEM, Dr. Selim Raihan (Executive Director) attended the program.

BIMSTEC Roundtable Meeting held in Gulshan, Dhaka

The 4th and 5th BIMSTEC Roundtable Meetings were held during 3-4 April 2016 in BIMSTEC Secretariat, Dhaka. The meetings were on "The Himalaya to the Bay of Bengal: Benefits of Integration" and "India's Look-East and Act-East Policies and BIMSTEC". Mr. Kanak Mani Dixit (Editor in Chief, Himal Southasian, Kathmandu, Nepal) and Mr. Bipul Chatterjee (Executive Director, CUTS International, Jaipur, India) presented in the meetings respectively. From SANEM, Ms. Sunera Saba Khan (Research Associate) attended both the meetings.

A talk on poverty and women empowerment

A talk on "Are women breaking the poverty trap? Changes in poverty and women empowerment in southern Bangladesh" was delivered by Dr. Akhter Ahmed from the Washington-based think tank, the International Food Policy Research Institute (IFPRI) on 11th April, 2016 at the Department of Economics, Faculty of Social Sciences, University of Dhaka. Dr. Selim Raihan (Executive Director, SANEM) was present during that talk.

Sub-Regional Public Private dialogue held in Dhaka

Organized by Metropolitan Chamber of Commerce and Industry (MCCI), SAARC Chamber of Commerce and Industry (SCCI) and The Asia Foundation (TAF), a Sub-Regional Public Private dialogue on promoting trade in Bangladesh-Bhutan-India-Nepal (BBIN) was held during 2-3 April, 2016 at Chamber Building, Dhaka. Welcoming remarks were provided by Mr. Tabith M. Awal (Chairman, Industry Sub-Committee, MCCI). Opening of the dialogue was carried out by the Chief Guest Mr. Hedayetullah Al Mamoon (ndc, Senior Secretary, Ministry of Commerce). Dr. Selim Raihan (Executive Director, SANEM) made a presentation on **"Application of Political Economy Approach for Effective Removal of NTBs in South Asia Sub-Region"**, which was followed by panel

discussion and Q&A. This session was chaired by Mr. Monoj Kumar Roy (Additional Secretary, Ministry of Commerce, Bangladesh). Other sessions included "SAARC-Trade Promotion Network", "Implementation Mapping of Various Bilateral and Multi-lateral Treaties and Identification of any Bottleneck issues", "Economic and Trade Implications of BBIN Motor Vehicle Agreement", "Diagnostic work on NTMs in the sub-region", "Progress and Challenges of Implementing SAARC Quality Standards", "Food Imports in India from the Region: Challenges and Solutions", "Role of Media in Trade Promotion and Policy Advocacy" and "Online Issue Tracker".

Dr. Selim Raihan at the IPS, Colombo

Dr. Selim Raihan made a presentation at the Institute of Policy Studies of Sri Lanka (IPS), Colombo on 4th April, 2016 on "Political Economy Approach to Deal with NTMs in South Asia". The presentation looked at the issues related to the political economy approach to regional integration, the current status and prospects in South Asia in terms of market integration, trade restrictiveness of NTMs in South Asia and how to deal with NTMs using the political economy framework. Dr. Saman Kelagama (Executive Director of IPS), Dr. Dushni Weerakoon (Deputy Director of IPS) and Dr. Janaka Wijayasiri (Research Fellow of IPS) were present in that event.

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SANEM is a non-profit research organization registered with the Registrar of Joint Stock Companies and Firms in Bangladesh. Launched in January 2007 in Dhaka, it is a network of economists and policy makers in South Asia with a special emphasis on economic modeling. The organization seeks to produce objective, high quality, country- and South Asian region-specific policy and thematic research. SANEM contributes in governments' policy-making by providing research supports both at individual and organizational capacities. SANEM has maintained strong research collaboration with global, regional and local think-tanks, research and development organizations, universities and individual researchers.

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