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The Necessity of Promoting Science Education for Policy Makers to Ensure Sustainable Development in Bangladesh

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As civilization progresses, the contributions of science and technology to economic development are truly incredible. After World WarII, investment policies on science and technology, social welfare and national security were the foundations of tremendous economic growth in different countries all over the world. Moreover, heavy investments on science and education accelerated economic growth in all developed countries. Without proper investments in science and technology, Bangladesh–having insufficient natural resources and over 160 million people–cannot establish a high income economy, and may not even keep pace with neighboring countries like India. For promoting development in every sector of Bangladesh, science based education and research can be the alternative to traditional agriculture and low skilled and low paying employment in the garment industry. Bangladesh also suffers from general science illiteracy and in the broader sense, it has not promoted science based education policies. According to the United States National Center for Education Standards (1996), "Scientific literacy is the knowledge and understanding of scientific concepts and processes required for personal decision making, participation in civic and cultural affairs, and economic productivity." Science literacy and reason based rational analysis lead to organized, systematic processing of information and inspire us to learn and solve problems we face today and we are going to face tomorrow. Policy makers (decision makers of a country who decide what is relevant) can play a vital role by taking policy decisions for overall development (social, political, cultural) in a scientific way. However, policy studies are more inclined toward Social Science (focus on behavior, attitudes, communities, institutions and so on). Unfortunately, policy makers of Bangladesh are sometimes unable to understand the fundamental needs of science education for sustainable development goals. Political leaders are obliged to give reasons for their policy choices in a democratic society like Bangladesh (policy makers offer reasons for their policy choice by addressing its goals and consequences). Social Science helps them in terms of rhetoric and communication skills. But it is not sufficient for tackling many problems, for instance, unplanned industrialization, global warming, atmospheric pollution, environmental degradation, species loss and so on. This requires more understanding of Science than Social Science. It is fairly obvious that evidence based research, policies, investigations and assumptions are more accurate rational, systematic and sustainable. It is true that as a developing country, there are many obstacles to implementing science education in a broad scale (lack of infrastructures, lack of qualified science teachers, inadequate laboratories and financial capabilities) along with policy maker's unwillingness for sake of political interest. Sometimes they are more inclined to look at party interests rather than public interests. Science based policy is rational (separate from political interests) and it can ensure the reflection of public interests where politics may be emotional, dirty, messy, chaotic and biased. It is important for policy makers to know and understand this. After getting enough evidence based knowledge and, at the same time, trying to reduce constraints of politics, decision

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makers can make better reason-based policies for better sustainable, enlightened, progressive future by using accurate, rational, and systematic knowledge.

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Introduction

Education can broaden opportunities for political, economic, social, environmental and cultural development. The purpose of education and its positive impact toward development–especially sustainable development–is well recognized. To achieve sustainable development, Bangladesh made a commitment to fulfilling all the sustainable development goals (SDGs) set forth by UNDP (UNDP, 2015). Bangladesh is committed fulfilling its target within 2030. It is almost a Herculean task to keep this promise as Bangladesh is an economically and politically vulnerable country with huge population. Bangladesh may need to find creative ways towards development and may need to modify current policies.

A common concern of among all cognizant citizens of Bangladesh is how we can achieve sustainable development goals within the given time frame using limited resources. One of the major solutions to attaining the desired goal could be "science" and "evidence-based policy." Science would be the more convenient platform to ascend the ladder of sustainable development because it is rational, systematic, and processed information that can help us to learn and solve problems which we face today and will face in future.

In this article I have tried to focus on the importance of science towards sustainable development, and basic understanding of science for policy makers to keep pace with global development as well as future development in Bangladesh. In my analysis, firstly I have tried to recognize challenges and barriers towards science education and then I have made some recommendations.

Science Education for Sustainable Development in Bangladesh

Sustainable development can be defined as "Development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (Brundtland Commission, 1987). It stands on three pillars namely, economic, social, and environmental. At the aspect of economic development–sustainable economic development can be achieved through developing country's economic status, increasing industrialization and infrastructural development in both urban and rural areas. Whereas, social development is achieved by improving education and health, controlling population growth rate, and eradicating gender discrimination. Sustainable development also requires the protection of the environment. By increasing forests and biodiversity, adopting environmental friendly policies to prevent ecological degradation, obeying international environmental rules and regulations, and building adequate waste and hazardous chemicals management systems, Bangladesh can strengthen sustainable development.

The 70th United Nation General Assembly started on 25-27 September, 2015 in New York, USA. It was a remarkable moment in human history as it declared sustainable development initiative along with 17 goals and 169 targets. It was declared that for the next 15 years, "This agenda is a plan of action for people, planet and prosperity. It also seeks to strengthen universal peace in large freedom" (as cited in Nath.K.D, 2015**)**. According to Helen Clark (2015), "World leaders have an unprecedented opportunity this year to shift the world onto a path of inclusive, sustainable and resilient development". The new worldwide goals for sustainable development were adopted for

the next 15 years till 2030 to end poverty, fight inequality and justice, and tackle climate change (UNDP, 2015). The 17 goals are as follows:

Goal 1: End poverty in all its forms everywhere.
Goal 2: End hunger, achieve food security and improved nutrition and promote sustainable agriculture.
Goal 3: Ensure healthy lives and promote well-being for all at all ages.
Goal 4: Ensure inclusive and quality education for all and promote lifelong learning.
Goal 5: Achieve gender equality and empower all women and girls.
Goal 6: Ensure access to water and sanitation for all.
Goal 7: Ensure access to affordable, reliable, sustainable and modern energy for all.
Goal 8: Promote inclusive and sustainable economic growth, employment and decent work for all.
Goal 9: Build resilient infrastructure, promote sustainable industrialization and foster innovation.
Goal 10: Reduce inequality within and among countries.
Goal 11: Make cities inclusive, safe, resilient and sustainable.
Goal 12: Ensure sustainable consumption and production patterns.
Goal 13: Take urgent action to combat climate change and its impacts.
Goal 14: Conserve and sustainably use the oceans, seas and marine resources.
Goal 15: Sustainably manage forests, combat desertification, halt and reverse land degradation, halt biodiversity loss.
Goal 16: Promote justice, peaceful and inclusive societies.
Goal 17: Revitalize the global partnership for sustainable development.

Every goal is significant and challenging for Bangladesh to accomplish within 2030 for various political, economic, and geographical reasons. The key priority areas for Bangladesh are 'agriculture, water, food security, energy, climate change, disaster risk reduction and disaster management, and biodiversity' (Bangladesh Government, 2012, p,8**)**. All these priority areas along with poverty elimination, access to clean water and sanitation, gender equality, safe and sustainable cities, and peaceful societies (Haque. N, 2015) are extremely challenging for a geographically disaster prone county like Bangladesh. Impediments of development for Bangladesh are as:

In social context, sustainable development indicators are population, health, education, and gender. By definition, development is not limited only economic growth, it has many non-economic factors and it is said that 'economic development is human development' (Islam F.M, 2007, p, 37). It is fair to say that Bangladesh suffers various forms of challenges towards social development. Bangladesh is a densely populated country. Although its population growth rate (currently, 1.6%) is decreasing day by day, it remains a great challenge for Bangladesh to control population pressure. The present population of Bangladesh is almost 160 million and it's a major concern of Bangladesh towards development. Due to huge population and among most of them (dependency ratios: 52.2% overall, among them youth dependency ratio is 44.9% and elderly dependency ratio is 7.3%, Index: 2014) are unproductive. They are far removed from development activities; as a result Bangladesh suffers slower progress toward economic and social development. With a vast population burden, Bangladesh faces various problems with regard to nutrition, health, increasing malnutrition, decreasing forests, land degradation, and many other environmental problems. Another social indicator is gender, and it is also a great challenge for Bangladesh to reach gender equality in all economic, social and environmental contexts. Although the government has taken various affirmative policies for women towards women empowerment, marriage, dowry and education, still a large number of women are deprived quality education and suffer domestic violence such as acid throwing, dowry crime, and psychological and physical torture as well as economic insecurity. Discrimination towards women increases poverty and poverty constrains

freedom of speech and thinking. Having all these constraints, it is not an easy task for Bangladesh to effectively realize sustainable development goals towards gender equality in all contexts.

In the context of economy, sustainable development is not possible without an inclusive economic growth. Economic aspects of development can be measured on 'GDP as it is a good indicator of the level of production' (Islam F.M, 2007, p, 39) and standard of living, FDI, RMG, ICT acceleration, and poverty alleviation strategies. Economic development is the pre-condition to accomplish sustainable development goals toward priority areas namely, agriculture, water security, food security, sustainable cities, transportation, and infrastructural development (Bangladesh Government, 2012, P.8). Energy is another indicator for development but Bangladesh suffers many challenges towards electricity production capacity extension and various economic investment policies with regard energy. Heavy investment policies, expansion of science research, expansion of energy production, and international cooperation are needed to reach sustainable economic development in Bangladesh.

In the context of environmental development, Bangladesh is a geographically disaster prone country having 160 million people along with insufficient and limited natural resources along probable devastating consequences of future climate change. Bangladesh faced with inadequacies in various areas such as making insufficient laws or non-implementations of laws for protecting forests and ecological balance, limited knowledge about hazardous chemicals and waste management and deficient information about global warming issues. Bangladesh–without having adequate knowledge , policies, and laws toward environment for present and future–can never achieve sustainable development goals in the stipulated time frame and also risks dangerous environmental consequences for example, river erosion, soil degradation, chemical contamination problems, water pollution, sound and air pollution. All these conditions are responsible for environmental hazards in Bangladesh as well as planet Earth.

To overcome the constraints and challenges discussed above, Bangladesh should take proper initiatives to achieve desired goals. So, what will happen in the future and what will be the possible solutions towards development challenges for Bangladesh? The solutions must be the priority based urgent policies which should include science and technology based education for all. The contribution of science education in the context of sustainable development and its various applications towards in the context on sustainable development technologies are well recognized. Science and technology based knowledge is at the center of progress and it is always essential for development. Scientific knowledge generates many new opportunities for window of development (Perth declaration, 2007; Rahman.M, 2014;World Bank, 2003**)**. Bangladesh needs to cope up with neighboring countries as well as globally in the context of development. It is high time we take visionary policies, investment heavily on science and technology and give special attention to promoting knowledge based society which is always a positive for every development domain. Enormous gap between theoretical and practical knowledge of science, lack of capacity building, and unwillingness of policy implementation means that Bangladesh is missing out on remarkable opportunities that science and technology can bring.

Science and technology can fight to alleviate the poverty, flourish economic growth and lessen the looming disaster of climate change. It is common phenomenon that the investment policies towards science between developed and developing countries vary from widely. Generally, developed countries such as USA, Canada, and Japan ensure heavy investment towards science and technologies and thereby they accelerate the process of human development and finally human resources foster economic, social, and cultural development. By observing the investment policies of developed countries, it might be easy to understand that science based knowledge can hasten

development. Therefore, it is equally applicable in the context of Bangladesh to foster its sustainable development. Promoting science education for all and getting practical knowledge Bangladesh can achieve success on priority areas. According to the Rio +20 (Bangladesh Government, 2012, p, 8), "The key priorities for Bangladesh for sustainable development are agriculture and food security, water, energy, climate change and disaster risk management." Bangladesh is a traditional agriculture based economy country and it may not very common to use scientifically advanced tools that can increase agricultural production. Introducing advance technologies towards traditional agriculture can increase production and decrease food scarcity. Every year arable land is being lost because of various natural disasters–flood, river erosion, cyclone, and drought. By using innovations and benediction of science and technology, Bangladesh can prevent the harmful consequences of natural disasters such as drought, saline water intrusion, extreme temperature (World Bank, 2003). Science and technology based knowledge can promote public awareness and help with building capacity for meeting future challenges towards environmental issues such as environmental degradation, inadequate fresh water, greenhouse gas effect, ground water paucity, and saline water presence.

Lack of advanced medical instruments and skilled physicians, Bangladesh has been facing difficulties in case of diagnosis of fatal diseases such cancer, HIV/AIDS, cardiac, and neurological disorder. Creating access to science and technologies, Bangladesh can improve its position on health, standard living opportunities and other public health related issues, at the same time; it can handle future challenges such as HIV/ AIDS, Zica virus, malaria, and water borne diseases.

Energy on the other hand, termed one of the main keys to development (Gates. B., 2016), is another challenge for Bangladesh. Expansion of energy (electricity) can widen new scopes of development for citizens; unfortunately many areas of Bangladesh remain outside of the electricity grid and those inside the supply network suffer from frequent outages. Science and technology based investment is necessary for promoting energy access for all. Energy is a pre-requisite of economic growth and development.

Many positive steps can be taken with regard to tackling all of these challenges. Among them science-based policies and knowledge can be the supportive gears of sustainable development for Bangladesh. 'Development is a multi-dimensional concept' (Islam F.M, 2007 p, 37) and sustainable development is very close to three pillars namely, social, economic, and environmental. Bangladesh has been committed to achieving its promises towards sustainable development by 2030. Bangladesh has already kept its promises toward eight millennium development goals (MDGs) by achieving success with regard to maternity health issues, child mortality rate reduction, prevention of many diseases, and universal education declaration. Bangladesh has been trying to achieve another four goals and made significant progress towards gender equity, poverty reduction, climate change, and developing universal cooperation for overall development in Bangladesh (Haque. N, 2015). With success towards the eight millennium development goals, Bangladesh may be more confident attaining the 2030 sustainable development goals within required time frame. Nonetheless, many people from different parts of Bangladesh suffer extreme poverty and hunger, malnutrition, education discrimination, and gender discrimination in both urban and rural areas. For sustainable progress, Bangladesh would have to take adequate, rational and evidence-based policies and also needs international cooperation and support.

To ensure sustainable development, Bangladesh needs to take urgent and priority based policies especially science based education and take rational and systematic approach to rendering education. The concept of science education for all citizens never got a vigorous attention before The Perth Declaration on science and technology education of 2007. Three important aspects are

discussed specifically, first one is traditional role of science in schooling; second one is sustainable technological development as well as scientifically informed citizens; and the last one is science education and application of digital technologies. (Fensham. J. P., 2008).

Science and knowledge based professionals can play important roles in economic development if they are able to correctly identify the problems that can be barrier for development. Professionals who are knowledgeable about the methods of science are likely to make better policies or decisions that are more environmentally friendly and sustainable compared compare to professionals who have no knowledge about science. Without adequate scientific knowledge, public sometimes feel confused about the applications of science and technology and it benefits and policy implications. According to the UNESCO (2008,p-4), "without the support and understanding of citizens, technological development can all too easily serve short term and sectional interests. The larger term progress of the whole society is overlooked, citizens will be confused about what should, and what should not be supported … and the environment will continue to be destroyed rather than sustained."

It is high time Bangladesh start making relevant policies towards sustainable development now. What are the more urgent and relevant policies? The answer can be the science and technology based policies and science education for all, especially for policy makers of Bangladesh. Knowledge based society can play a very important role for all development domain. UNESCO (2008, p-5) stated, "Schooling is now being challenged to contribute to the development in students of an active repertoire of generic and subject-based competencies. This contrasts very strongly with existing priorities, in subjects like sciences that have seen the size of a student's a store of established knowledge as the key measure of success. Science and technology education needs to be a key component in developing these competencies."

Promoting Science Education for Policy Makers in Bangladesh

There is a common belief among people all over the world about science education and that is: science classes are not for all; it is for elite students (Aikenhead, 2005). Elite students mean students who are very clear in understanding or want to become scientists or science professionals (Aikenhead, 2005; Driver, 1996; Fensham, 1992). This was stated with regard to Western countries, but it is almost the same in Bangladesh (Nath. K. D, 2015). Unfortunately, the number of science student's enrollment in secondary school certificate level has decreased alarmingly in the past 10 years (Nath. K. D, 2015; USS, n.d.). Science education quality is not good, students feel as it is a foreign culture (Aikehead, 2005) and science curriculum is more difficult and expensive (UNESCO, 2008; Nath.K.D, 2015). Quality education is a rising demand but Bangladesh has no adequate policies yet. It has stumbled for various reasons such as weak curriculum, insufficient budget, unskilled science teachers and inadequate facilities for science students, low quality textbooks, lack of laboratories, students and parents' unwillingness, and finally lack of lucrative future career compared to commerce students. Science education for Bangladesh is urgent as it can foster creativity, discoveries and innovation–all of is beneficial for sustainable and environmentally friendly development. Without giving priority for promoting science and technology "Digital Bangladesh" dream will be retain a distant dream (Haque. N, 2015**)**.

Now question is who decides "what is relevant?" (Fensham, ascited in Aikland, 2005) and "Relevant for whom" or "Relevant to what?" (Aikland, 2005). Traditionally, policy makers make policies for a country. Policy makers or decision makers of a country (who decide what is relevant) can play a vital role for development acceleration by taking ideal policies for overall development (social, political, cultural) in a scientific way for a country, although policy studies are more inclined to Social Science. Social science received great attention in Coleman report (the landmark1966 study

on Equality of Educational Opportunity) focused on policy issues such as education, racial disparities and social welfare matters. Social science focuses on behavior, attitudes, communities, institutions and works for society's sake. Three decades after the Coleman report, evidence based policy making started to receive greater importance compared to social science (Kenneth. P, et al., 2012).

It would not be presumptuous to say that policy makers of Bangladesh are more or less exposed to science based knowledge but it might not be adequate for making science-based policy; rather they are more inclined towards social science. Basic scientific knowledge is necessary to understand and make urgent policy decisions towards ecological balance climate change, environment, energy, and biodiversity. Generally, policy makers are advised by academic researchers, scientists and science education officials (Elves. W M, et al., 2013). But often there is a communication gap between policy makers and science policy analysts as well as the scientific community. As a result, genuine knowledge exchange is not accomplished (ibid,2013). According to the Matthew Goodwin (2013) (as cited in the Guardian, 2013), "Policy makers and academics are different breeds who speak different languages." By promoting scientific literacy and knowledge for policy makers, we can reduce the communication and understanding gap between scientists and policy makers in Bangladesh and can better enjoy the benefits of science towards human welfare.

Scientific knowledge is necessary for policy makers who value reason based policies. Policy makers sometimes may not favor certain policies even though those policies are good for development because of political interest and party pressure. There is a great distinction between science and politics. How science can be separated from politics is summarized by Deborah Stone (2001, p. 376; as cited in Kenneth. P, 2012). "Inspired by a vague sense that reason is clean and politics is dirty, Americans yearn to replace politics with rational decision making." Contemporary writings about politics, even those by political scientists, characterize it as "chaotic," "the ultimate maze," or "organized anarchy." Politics is "messy," "unpredictable," an "obstacle course" for policy and a "hostile environment." "Policy is potentially a sphere of rational analysis, objectivity, allegiance to truth, and the pursuit of the wellbeing of society as a whole." On the other hand, "[p]olitics is the sphere of emotion and passion, irrationality, self-interest, shortsightedness, and raw power."

The history of Bangladesh has many times seen policy makers making policies that are politically and ideologically biased irrational policies. For example, after the emergence of Bangladesh on 16th December 1971, student communities, intellectuals, and political leaders urged for universal and secular education system for Bangladesh. But it was destroyed after the assassination of Sheikh Mujibur Rahman, president of Bangladesh. Later, military regimes continued making alliance with Islamic parties. Islamic party's patronized ideology based education (Islamization in education) rather than secular and universal education. (Rahman**.** M, 2014).

It is high time we remove ideology from policy when it comes to high priority areas like policies for sustainable development in Bangladesh. Evidence based policies can accelerate development as well as ensure a prosperous Bangladesh for future generations that does not suffer from environmental degradation. Having basic scientific knowledge will enhance the policy makers' capacities to enact the most appropriate policy directions and can play a vital role towards sustainable development of Bangladesh.

Concluding Remarks

As a developing country, education for all is still a big challenge for Bangladesh. In this perspective it is difficult to establish and implement sound policy which will ensure science education for all. Moreover, Bangladesh faces various problems: inadequate budget, under-skilled science teachers,

limited lab facilities, lack of reliable electricity supply, insufficient infrastructure, unsatisfactory teaching methods, political turmoil, lack of lucrative career opportunities, and unwillingness of parents and students. To overcome these constraints and to establish sound science based education, we should focus on adequate budget, skill development training, sufficient energy, sound lab facilities, sufficient infrastructure development, political stability, shining future career, building awareness among parents and students, especially ensuring meaningful and deductive teaching methods. Taking rational and science education policy, we can make a prosperous nation. Reason based education will be helpful for promoting sustainable development as well as reducing gender discrimination. As a result, all citizens would be the part of the process for sustainable development.

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