Social, Economic and Political Implications of Nuclear Power Plant in Bangladesh

Ridoan Karim,Md. Ershadul Karim, Abu Bakar Bin Munir, MD Shah Newaz
Faculty of Business and Accountancy, University of Malaya, Malaysia.
saminewaz@gmail.com

Abstract
Whether a global nuclear renaissance will usher or sustain, the affair hinges on a myriad of the socio-political and economic factors. In one hand, the consistent rise in the prices of oil, coal, fossil fuels and on the other, the lack of natural gas reserves has indicated the struggle of Bangladesh for energy demand, which is eventually going to persist in future. Consequently, due to the scarcity of oil and natural gas resource, nuclear energy surfaces as a palatable strategic option for Bangladesh's future development agenda. However, a successful nuclear power program entails an extensive infrastructure. The control of nuclear energy is one of the prime concerns of science, industry, and politics. Henceforth, emancipating these issues, the paper will analyse the social and political implications regarding the incorporation of nuclear power plant in Bangladesh. The study of this paper is based on secondary sources where a qualitative research is conducted to analyse the socio, political and economic issues relating to the nuclear energy generation in Bangladesh. The study combines doctrinal and comparative socio-legal analysis. Consequently, one of the prime researches of the paper will skirt around the topic related to the public awareness and embroilment of such nuclear energy development in Bangladesh. The paper recommends Bangladesh to adopt a comprehensive energy law that should be realigned to consider noteworthy emphasis on sustainability, developing technical, financial and institutional constraints, and promoting public awareness and involvement associated with the generation of nuclear energy.

Keywords: Reactor safety, Nuclear waste treatment, Nuclear Regulation, Public acceptance

Introduction
Nuclear energy has emerged as an issue of global and local importance, propelled in large part by increased costs of fossil fuels, rising energy needs, concerns over inefficiencies in the energy mix, security of energy supply, climate change, its cleanness as less carbon polluting than fossil fuels, raw material availability, technicians and scientist's interests etc. Nuclear power supplies a large amount of the world's electricity needs. Likewise, the case Bangladesh is no exception.

The consistent rise in prices of oil, coal, fossil fuels and the lack of natural gas reserves has meant that Bangladesh's struggle for energy demand is going to persist in future. The environmental impact of this phenomenon should not be discounted either (Qvist & Brook, 2015). Under these circumstances, nuclear energy is an attractive strategic option for the Bangladesh government. This reflected in the government's decision to construct nuclear power plants to stimulate the ongoing economic growth and meet consumer and industry demands. Thus, Bangladesh has undertaken serious initiatives to commence nuclear power plants to mitigate the ever-surging power demands in one of the sprinting economies in the world.

The objective of the paper is to analyse the social, regulatory, economic and political practices of the countries which have a long experience in nuclear energy production and to recommend the government of Bangladesh to adopt some of them. The paper recommends Bangladesh to adopt a comprehensive energy law that should be realigned to consider more noteworthy

emphasis on sustainability. Bangladesh also needs such a comprehensive atomic energy law in order to strengthen nuclear safety laws. The nuclear energy production cannot bring development if government of Bangladesh cannot possess solid state inclusion in managing monetary advancement, centralization of national energy planning, efforts to connect innovative advance to a national rejuvenation, impact of technocratic philosophy on approach choices, subordination of difficulties to political hegemony, and paltry scale of civic activism in the country. In sum, it is high time for Bangladesh to take all necessary steps that can assure a safe, sustainable and efficient nuclear energy production.

Prospects and Challenges of Nuclear Energy in Bangladesh

While Bangladesh has been known worldwide as an agriculture-based economy that frequently combats natural disasters, it has undergone significant industrialization in the past two decades. The proportion of heavy industries' contribution to the gross domestic product bears testimony to that. Thus, it is hardly surprising that Bangladesh's policy makers have connected the increase of power generation to raise the GDP growth. The greatest ratio behind the nuclear power production is the prospect of minuscule input to produce an immense amount of power. The first batch of these projects, Ruppur (located in Pabna district) (M. A. Haque & Rahman, 2010), is a joint collaborative effort with Russia's state-based Nuclear Energy Corporation (Rosatom).

Prospects

Amidst the renewable sources of power, Nuclear energy turns out to be much of a lucrative pick within the wellspring of energy. And as we speak, this sheer power-source cater to 4.8% of this planet's call for energy and 9.7% of the Organization for Economic Co-operation and Development's (OCED) energy requisite (Hariharan, 2011). Be that as it may, the quest persists on how reliable the nuclear energy is in contrast with the alternative wellsprings of energy, for instance, hydroelectric & photovoltaics pertain to environmental and safety matters, economic viability, and keeping the future frame of mind.

This comparison is difficult to make since an extensive number of variables are related with these energy technologies. To cite an instance, location is one such vital factor. To exemplify, wind turbines demand powerful gust of wind and vast flat stretches of land, photovoltaics operate in optimum within territories drawing sunlight year-round, and hydroelectric power needs huge fast-streaming water-ways (Nicholson, 2012). Again, to avail the supply of conventional fossil-fuel is a crucial factor as well since its transportation can be quite pricey. To exemplify, France generates 80% of their total electricity by using nuclear power plants as they virtually have zero natural fossil fuels (Olah, 2005).

Nonetheless, the cost of nuclear energy is critical to pin, which again relies on numerous factors. While putting coal, gas, and oil in comparison with nuclear energy, by and far, the former turns out to be an expensive alternative (Grübler, 2004). The strength of nuclear energy is its colossal steadfastness of 'Price' since fuel represents only 31 percent of production costs (Yetiv, 2004). Fuel costs soar up to 80 to 90 percent when electricity is generated by consuming coal or natural gas (Yetiv, 2004). This makes fossil-fuel plants electricity production exceedingly sensitive due to price-fluctuations in coal & gas.

Nuclear Energy's appeal sprawls in vast quantities, for example, its "cleanliness" (environment-friendly), enormous fuel energy density and inexpensive transportation. Moreover, the technology underpinning nuclear energy is highly- advanced than that of photovoltaics, for instance, the technology which is still a work in progress since energy efficiencies have improved. Consequently, a rapid increment in energy supplied was prompted by nuclear power plants since

the 1970s.

However, evolution has backed off because of escalating expenses from financing challenges, increased safety regulations, and prices of competitive technology. Many experts believe that nuclear energy's future growth is, and more importantly should be, limited (Lior, 2008). Countries tagged-developing (rapidly), such as India and China, where mounting expenses are not much of an issue since capital & financing costs are much lower than that of in the US. Therefore, as nuclear energy may have a stifled future in developed countries, it might have a market in less-developed countries (LDC).
In cases, where the energy management is not efficient and the lack of natural gas reserve is still an unresolved challenge, nuclear energy itself is a very prospective option for Bangladesh. Despite enthusiasm at the state's administrative level, some resistances exist in the implementation of nuclear power plants, especially in the form of negative perception and attitude held by certain quarters of the population and intellectual crowd. However, some experts contend that such negative mindset may be overcome in a relatively small amount of time once the public grows tired of the rising fuel cost (Sovacool & Valentine, 2010). This is bolstered by the fact that Bangladesh Government has been actively, on an incremental basis, raising the power prices since 2010-2011 (Kabir, 2011). However, for substantial progress to take place in the nuclear power attainment, many obstacles would have to be surmounted (Kessides, 2012). These barriers can be classified, in broad terms, based on technical, financial, and institutional constraints. It is also inevitable that amplifying nuclear power as a source of electricity is the optimal choice for the developing countries like Bangladesh.

Challenges
One of the fundamental points concerning immediate interest for the nuclear energy-active countries will be the preparation and accessibility of qualified staff to meet the overwhelming needs of the proceeding and extending programs. In any case, the 'human resource advancement' needs to incorporate every one of the issues that influence human execution, for example, initiative, administration frameworks, working society, nuclear information administration, and individual states of mind. Specifically, for the Bangladeshi landscape, it is imperative that a fruitful atomic power program requires a broad framework. This incorporates nuclear establishments, facilities, investigate associations, administrative facilities, government divisions with atomic skill, and instructive organizations with the suitable nuclear preparing programs.

Moreover, political stability has been an ever-present predicament since Bangladesh's inception, which impedes not just the nuclear power plant projects but also economic development and industrialization process in general. In addition, the high initial costs of embarking a nuclear power plant project reverses the tepid public attitude towards nuclear energy, convincing them of safety of such projects, building a workable nuclear energy law, and developing capable human resources to operate such projects are matters of concern as well.

Environmental experts also underline the need for emphasizing sustainability and safety regulations to prevent unwanted blowback in the event of disasters (Wildermuth, 2011). The safety and security of the new nuclear establishment specifically rely on how Bangladesh government manages to protect, exchange and further develop nuclear information and knowledge inherited from the countries which have experience in nuclear power plants, such as United States of America, Russia, China, and Japan. It is necessary for Bangladesh to broaden the discourse on two focal issues of nuclear education administration which are progression arranging and nuclear data conservation. The upcoming generation of operators, programmers,

physicists, engineers and other relevant work-personnel must be equipped for applying, controlling, and advance creating nuclear innovations in Bangladesh.

Scholars always contended that it's not the disastrous event, rather the regulatory ineptitude added to the most noticeably bad nuclear calamity since Chernobyl had clarified how the comfortable connection dispatch among the administration, controllers, and nuclear administrators is the prime explanation behind debacle (Wang, Chen, & Yi-chong, 2013). A successful nuclear power program requires an extensive infrastructure (Jewell, 2011). It is a question of fact that whether Bangladesh, still known as a developing country, can build the infrastructure which eventually secure the safety concern of the nuclear power plant. Building infrastructure includes nuclear installations (Jewell, 2011), facilities, research organizations (Yanev, 2013), regulatory agencies, government departments with nuclear expertise (Yanev, 2013), and educational institutions with the appropriate nuclear training programs.

Recommendations for Nuclear Power Plant in Bangladesh

A gradually developing economy keen on procuring its first Nuclear Power Plant regularly does not have the vital legitimate and administrative structure to guarantee appropriate outline, development and safe operation of its nuclear workplace (Echavarri, 2007). The outcomes of failure of an atomic facility can go well past its national limits, one just can't let the administrator of such a facility to manage itself (La Porte & Thomas, 1995). Then again, it is not ingenious to request that an emerging nation set up an absolutely autonomous administrative body to screen its first NPP (M. M. Haque, Islam, & Zulquarnain, 2009). The trade-off, which is frequently made is to set up a different gathering inside the nuclear experts to execute the administrative viewpoints.

Creating a Comprehensive Legal and Regulatory System

The only law regarding nuclear power project is the *Nuclear Power Plant Act 2015* which sets up the Nuclear Power Company of Bangladesh (NPCB) to run the plant, though the ownership remains with the Atomic Energy Commission (BAEC). However, the law does not contain any provisions for the consequences of any nuclear power plant disaster. Bangladesh needs a comprehensive law on nuclear power production which is necessary in order to guide the future safe energy production. The government should make clear policies to address the impact of nuclear safety regulations and liability rules. The liability rules must address channeling of liability through the nuclear plant operator, raise the general issue of the optimality of mandating or even allowing, transfers of liability from one agent to another as part of a set of liability rules.

At present, Nuclear Safety and Radiation Control Division (NSRCD) is working as the regulatory wing of Bangladesh Atomic Energy Commission (BAEC). There is a plan to form an independent regulatory body. A new act has already been submitted to the Government entitled "Bangladesh Atomic Energy Regulatory Authority-06" with a view to establishing a suitable organization having the adequate independence to meet the IAEA/National obligations for ensuring nuclear safety and radiation control in the country. For the most part, the common law of torts decides the common risk for most accident related expenses (Trebilcock & Winter, 1997). Be that as it may, for accidents occurring at nuclear power plants, statutes in numerous nations extremely limit the utilization of tort law (Faure, 1995). In this way, we urge the Bangladeshi Government and the competent administration to assess the monetary impacts of these constraints, looking at the security motivating forces under the current laws to venture a realistic risk estimation. It cannot be denied that upgrading and strengthening a nuclear regulatory system is not optional but imperative to prevent any disaster relating to the nuclear power plant.

Accordingly, Bangladesh also needs a comprehensive “Atomic Energy Law” (Cohen, 1979) to strengthen nuclear safety laws and to establish a nuclear safety fund in order to provide adequate compensation during the event of an accident. Such laws should also provide optimal liability scheme for the Government of Bangladesh which expounds the following topical challenges: full strict liability for the operator; (Trebilcock & Winter, 1997) joint and several liabilities with upstream suppliers (Trebilcock & Winter, 1997), the upstream suppliers' liability (Hewitt, 2008) being restricted to a negligence standard; (Hariharan, 2011) mandatory liability insurance (Hariharan, 2011) to be provided by the market to some extent, and above this amount by the government. As the tort law does not exist in a legal form in Bangladesh, such regulations must also describe the role played by criminal law in ascribing meaning to people's actions on and after the events of any disaster which might happen due to the negligence of the government or the operator.

Need for Public Awareness & Involvement

Moreover, the Government of Bangladesh ought to likewise clarify explanations on their methodologies towards the most imperative focuses identifying with the nuclear power plant, for example, radiological assurance of laborers, radiological insurance of open, radioactive waste administration and ecological radiological examination. Open mindfulness and contribution are likewise rudimentary before setting up the nuclear power plant. Though exceptionally progressed and refined new reactors may decrease perils in light of "characteristic" security features, for instance, "latently sheltered" measures made by the era III reactor, we assume that any country that does not give genuine straightforwardness and enable open commitment with respect to atomic issues ought to never use atomic vitality. Along these lines, the Government of Bangladesh should contribute convincing consideration work to keep up open responsibility. It should be yielded that atomic expert expansion is in the meantime social, political, and financial, and along these lines, the Government of Bangladesh should take the perspectives of masters in different fields before totally chipping away at the nuclear power era.

In spite of satisfactory access to assets, able labor and coordination, developed (affluent) nations like Germany, Switzerland, and Italy have understood that atomic power era dangers are inadmissibly high. In this manner, it is not legitimate to proceed with the atomic vitality alternative in spite of its indicated benefits. Moreover, other vitality sources like sustainable sources posture less threat and look good for these progressed countries– both physically and in addition financially. Besides, as of late, two planned atomic power plants with help from Russia and Japan have been rejected by Vietnam and the prime reason referred to the cancelation is vital threat to the earth. Despite the fact that the two plants guaranteed to slake the vitality emergency that Vietnam confronts, it was in the long run chosen that the cons far exceed the masters. The cancelation of these two plants supported by Russian state-claimed ROSATOM and a Japanese consortium should be fit for producing 4000MW worth of energy. Had they been introduced, they would have been the biggest atomic power plants in South East Asia. In any case, atomic power alternative is one the best activity to take care of the vast energy demand for any monetarily creating nation like Bangladesh. Subsequently, it is the perfect time for the administration of Bangladesh to make all the vital strides in setting up the atomic power plant securely and proficiently.

Moreover, other than these huge steps, the organization of Bangladesh ought to moreover have strong state commitment in controlling fiscal change, centralization of national vitality masterminding, endeavours to interface imaginative advances to a national restoration, effect of technocratic conviction framework on course of action decisions, subordination of troubles to

political administration, and low levels of urban activism which are convincing components in supporting the augmentation of atomic power. The article recognizes that a level of unsteadiness weaving machines whether these propositions are followed in bracing legitimate and administrative structure in Bangladesh for the atomic power plant.

Conclusion

Bangladesh has distinguished atomic power as a piece of sustainable energy framework. Usage of Ruppur NPP is a piece of energy security plan of Bangladesh and development of 2000 MW atomic limit has turned into an integral piece of the 'Vision 2021' (Akbar, 2012) of Bangladesh Government. Pragmatic strides towards setting up national atomic power framework for building "Ruppur NPP" by 2020 have as of now been taken and along these lines, the government ought to consider for building up an instrument of coordination among Bangladesh, the recognized enterprises, and IAEA (Akbar, 2012). After a large portion of a century of fruitful advancement, experiencing superb achievement and eagerness and indistinct feedback, nuclear power has made a substantial commitment to human advancement. No other energy innovation has such an across the board widespread demand, spanning from nuclear material science, physical sciences, chemistry, biology, medicine, and other disciplines like software engineering, psychiatry, or pharmacy. The education to utilize atomic innovation has been aggregated amid the most recent fifty years and must be managed promote irrespective of the part nuclear energy will play in the 21st century onwards. The safety and security of the presently existing nuclear establishments and particularly the new ones that are being manufactured and anticipated that would be inherent in the creating scene, which will frankly rely on how countries, governments, and regional powers learn to implement, design, safeguard, exchange and further develop nuclear learning and talent around the world.

Reference

- Akbar, M. S. (2012). Energy and nuclear power planning in Bangladesh. Nuclear energy for energy security. Side Event at the GC, 56.
- Cohen, L. (1979). Innovation and atomic energy: Nuclear power regulation, 1966-present. Law and Contemporary Problems, 43(1), 67-97.
- Echavarri, L. E. (2007). Is Nuclear Energy at a turning point? The Electricity Journal, 20(9), 89-97.
- Faure, M. (1995). Economic models of compensation for damage caused by nuclear accidents: Some lessons for the revision of the Paris and Vienna Conventions. European Journal of Law and Economics, 2(1), 21-43.
- Grübler, A. (2004). Transitions in energy use. Encyclopedia of energy, 6, 163-177.
- Haque, M. A., & Rahman, J. (2010). Power crisis and solution in Bangladesh. Bangladesh Journal of Scientific and Industrial Research, 45(2), 155-162.
- Haque, M. M., Islam, M., & Zulquarnain, M. (2009). Challenges and Opportunities to Introduce the First Nuclear Power Plant in Bangladesh.
- Hariharan, A. (2011). India's Nuclear Civil Liability Bill and Supplier's Liability: One Step Towards Modernizing the Outdated International Nuclear Liability Regime. Wm. & Mary Envtl. L. & Pol'y Rev., 36, 223.
- Hewitt, T. (2008). Who is to blame? Allocating liability in upstream project contracts. Journal of Energy & Natural Resources Law, 26(2), 177-206.
- Jewell, J. (2011). Ready for nuclear energy?: An assessment of capacities and motivations for launching new national nuclear power programs. Energy Policy, 39(3), 1041-1055.
- Kabir, M. (2011). Energy Sector of Bangladesh: An Overview. Bangladesh Institute of International and Strategic Studies (BIISS), Dhaka, 24.

- Kessides, I. N. (2012). The future of the nuclear industry reconsidered: Risks, uncertainties, and continued promise. Energy Policy, 48, 185-208.
- La Porte, T. R., & Thomas, C. W. (1995). Regulatory Compliance and the Ethos of Quality Enhancement: Surprises in Nuclear Power Plant Operations1. Journal of public administration research and theory, 5(1), 109-138.
- Lior, N. (2008). Energy resources and use: the present situation and possible paths to the future. Energy, 33(6), 842-857.
- Nicholson, M. (2012). The Power Makers' Challenge: And the Need for Fission Energy: Springer Science & Business Media.
- Olah, G. A. (2005). Beyond oil and gas: the methanol economy. Angewandte Chemie International Edition, 44(18), 2636-2639.
- Present Installed Generation Capacity (MW). (2017). Retrieved from http://www.bpdb.gov.bd/bpdb/index.php?option=com_content&view=article&id=5&Itemid=6
- Qvist, S. A., & Brook, B. W. (2015). Environmental and health impacts of a policy to phase out nuclear power in Sweden. Energy Policy, 84, 1-10.
- Sovacool, B. K., & Valentine, S. V. (2010). The socio-political economy of nuclear energy in China and India. Energy, 35(9), 3803-3813.
- Trebilcock, M., & Winter, R. A. (1997). The economics of nuclear accident law. International Review of Law and Economics, 17(2), 215-243.
- Wang, Q., Chen, X., & Yi-chong, X. (2013). Accident like the Fukushima unlikely in a country with effective nuclear regulation: Literature review and proposed guidelines. Renewable and Sustainable Energy Reviews, 17, 126-146.
- Wildermuth, A. J. (2011). The Next Step: The Integration of Energy Law and Environmental Law. Utah Envtl. L. Rev., 31, 369.
- Yanev, Y. (2013). The challenge of managing knowledge in nuclear energy development. Energy Strategy Reviews, 1(4), 282-285.
- Yetiv, S. A. (2004). Crude awakenings: global oil security and American foreign policy: Cornell University