Environmental Consideration of Infrastructure Projects under Public Private Partnership: Sustainable Development Perspective

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Abstract

The study was conducted to assess the status of Environment Impact Assessment (EIA) and explore the environmental protection measures taken for infrastructure projects under the Public-Private Partnership. The finding of the study reveals that the quality of the EIA process for infrastructure projects under PPP in Bangladesh is still unsatisfactory. Near about 50% of respondents opined that steps of EIA being partially followed and poorly considered in environmental pollution control measures. Most of the PPP infrastructure projects not at all provide for the stewardship of ecosystems and biodiversity conservation and don't follow the proper guidelines of EIA besides having a paper-based environmental hazard mitigation plan but not in practices. Capacity building of DoE staff, a corruption-free and flexible administrative process would be helpful in an effective EIA process for infrastructure projects under PPP.

Keywords: Public-Private Partnership, Environment Impact Assessment (EIA), Environmental aspects, Stewardship, Capacity building, Sustainable Development, Infrastructure

1.0 Background of the Study

PPP, short for Public-Private-Partnership, is a management model that encourages the government to strengthen its links and cooperation with the private sector and enterprises. Now a day, PPPs have been used as a valuable tool to close the gap between public services and social needs (Berrone. *et al.,* 2019). It has become more popular around the world as an innovative model for infrastructure and public service delivery (Cheng. *et al.,* 2020) and Governments around the world have increasingly turned to private sector involvement in the development, financing and provision of public infrastructure and services (Maynard, 1986, Zheng, et al., 2008, Mahoney, et al., 2009, Anderson, 2012). However, it's facing the dilemma of development direction, and value orientations (Cheng, *et al.,* 2020) are mostly performed in economic perspective.

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Public-private partnerships for sustainable development have been in operation for several decades from the local to the international level (Marx, 2019) and leads according to sustainable development goals (Cheng et al. 2020). In fact, the United Nations (UN) proposed collaboration across multiple stakeholders as one of the key goals for securing global sustainable development (Berrone et al. 2019). Incorporating all the basic needs like health and education for all, to access to energy, clean water and sanitation, most of the SDGs imply improvements in infrastructure (The Economist, 2019). Presently, as the world seeks to meet ambitious targets, such as the SDGs and the Paris Agreement on climate change, infrastructure is becoming more widely recognized. Infrastructures provide the foundations for virtually all modern-day economic activity. Infrastructure plays a key role in all three dimensions of sustainable development: the economy, the environment and society (The Economist, 2019). Moreover, in the changing climatic conditions, congestion etc. has been increased environmental pressures, turning the spotlight firmly on the inherent tensions between the imperative for further infrastructure development and the quest for sustainability (Infrastructure to 2030, OECD, June 2006). Social and economic development in Bangladesh has been growing rapidly, but at the same time, the degree of environmental pollution has been deepening, which has brought many threats and challenges to the construction of ecological civilization in recent years. The prevention and control of environmental pollution have become a social issue of great concern. In infrastructure projects, environmental pollution control and biodiversity are important content and a key link to contemporary environmental governance. Infrastructure is the backbone of modern society; the investment is often seen as a panacea to boost the economy. Myriads of infrastructure projects have been completed or planned across the globe in every year, and besides the welfares, the construction of infrastructure projects quite often incurs environmental damages and social consequences, more or less (Chi, *et al.,* 2016).

To minimize the negative externalities of construction projects, most countries (191 according to Morgan 2012) mandate the implementation of EIA (Environmental Impact Assessment) at a certain stage(s) of a project within their jurisdiction. EIA has long been promoted as an instrument for preventive environmental management often yields to economic consideration and political negotiation, and the uncertain and complex nature of environmental issues and the political nature of project planning provide fertile soil for this to happen (Chi, *et al.,* 2016). EIA is a planning and management tool for sustainable development (Roy, 2001) which helps in identifying the type, magnitude and probability of environmental and social changes which had a possible mitigation plan (Harvey, 1998; Momtaz, *et al.,* 1998; Thomas, 1998). From the perspective of sustainable development, the evaluation and analysis of the mode of environmental pollution prevention and control will help to improve the efficiency of resource allocation and pollution control, improve the enthusiasm of social capital, to form effective competition, and to reduce the costs of infrastructure projects under PPP.

In Bangladesh, infrastructure projects under PPP to some extent increased the risk of environmental degradation and biodiversity. So that contradiction between the PPP project financing and governance effect in the next period may emerge. Therefore, in the near future and long-term environmental control under the premise of PPP projects a wide range of promotion, evaluate the research and optimize countermeasures is particularly important from the view of perspective of sustainable development (Rong & Yalong, 2018).

Considering these views, this study focused on the following objectives: 1) to assess the status of EIA (Environmental Impact Assessment) for infrastructure projects under the Public-Private Partnership, and 2) to explore the protection measures taken for ensuring environmental sustainability in infrastructure projects under the Public-Private Partnership.

2.0 Methodology of the Study

The outcomes of the interviews conducted were absorbed in the questionnaire administered for assessing the environmental impact assessment (EIA) performances and protection measures adopting in infrastructure projects under Public-Private-Partnership for environmental sustainability.

The study was confined to 05 (five) mega infrastructure projects, with 07 (seven) respondents from each project interviewed. As respondents for this study, 35 professionals with PPP project experience (table 1) were chosen. Besides this, a total of three Key Informant Interviews (KII) were conducted with government officials of the Department of Environment (DOE) and EIA practitioners. The pertinent secondary information and reviews were collected from relevant articles, newspapers, and action plans of the government, and relevant websites.

The questionnaire was structured with some open and closed-ended questions relating to the objective of the study. Relevant data, opinions and statements collected from the respondents were put against a rating scale. To assess the status of EIA in infrastructure projects under PPP, this study utilizes a set of evaluative criteria proposed by Wood (1995) and modified by Annandle (2001).

Table 1: Number of Questionnaires Administered

Groups/Type of Establishment	Number Administered
Government Officials	09
Concessionaire	02
Engineer	12
Consultants	04
Contractor	08
Total	35

For improving EIA system and its practical application, the national EIA systems have been widely reviewed against international standards in many countries (Zeremarian & Quinn, 2007). To assess EIA in its international context, Wood (1995) developed a set of 14 comprehensive evaluation criteria. These criteria are based on the EIA legislation, administration, process and measures to improve effective EIA system (Badar, 2009).

On the other hand, Annandle (2001) slightly modified Wood's criteria to incorporate small developing countries' organizational and jurisdictional cultural issues. To evaluate EIA system in Bangladesh, Ahmad and Ferdausi (2016) used Annandale's modified Wood criteria. Fourteen selected criteria of woods (1995) regroup into seven categories by Ahmed and Ferdausi (2016) which are legal/administrative backing, preliminary assessment, detailed assessment, EIA study review, decision-making, follow-up and administrative support. Environmental protection measures adopting in infrastructure projects under PPP arrangement were measured using 6 points Likert scale: very good, good, moderate, fair, poor and not at all 5, 4, 3, 2, 1 and 0, respectively.

Due to time and resource limitations, primary data has been collected only from 35 respondents of 05 (five) mega infrastructure PPP projects. Where top-level government and private sector officials engage with PPP were difficult to reach. Aside from that, due to government policy, there was sometimes a limited scope for sharing information, and not all required data could be made available.

3.0 Result and Discussions

Selected Characteristics of the Respondents of the study

According to the objectives of the study, data were collected from a sample of 35 respondents who are involved in the PPP project. The findings of each selected characteristic of the respondents are presented in table 2.

Table 2: Selected Characteristics of the Respondents

Characteristics	Categories	Respondents	
		No.	Percent
Age	Young (Up to 40)	10	28.57
	Middle (41-60)	23	65.71
	Old (Above 60)	2	5.72
Educational qualification	General Graduate/B.Tech./BSc	9	25.7
	Architecture	4	11.4
	Engineering	9	25.7
	M.Tech/MSc,	9	25.7
	LLB	4	11.4
Sector Belongs	Public sector	7	20.0
	Private sector	18	51.4
	Both	6	17.1
	Academic sector	4	11.4
Experiences of Infrastructure projects	5 years or below	9	25.71
	5–10 years	8	22.86
	11–15 years	11	31.43
	Above 15 years	7	20.00
Experiences of PPP projects	1–2 years	12	34.3
	3–5 years	17	48.6
	6–8 years	6	17.1
Type of Project Experiences with	Hospital	1	2.9
	Transportation	17	48.6
	Land Port development	4	11.4
	Water and Sanitary	2	5.7
	Power and Energy	4	11.4
	Housing	5	14.3
	School and Education	1	2.9
	ICT services	1	2.9

The respondents were classified into three age groups: ‘young’ (up to 40 years), ‘middle-aged’ (41–60) and ‘old’ (> 60). The majority of respondents belong to the middle-aged category. Based on the educational background, respondents were divided into five groups. The largest proportion (51.14%) of the respondents had engineering and MSc in technical education, 25.7% had Hons. in general education, 11.4% had Architecture and L.L.B background. Regarding sector belongs, 51.4% of respondents working for the private sector, followed by 20% with a public sector. One-third of the respondents had 11-15 years of experience (31.43%) in infrastructure development. The highest proportion of the respondents worked for transportations projects under PPP and most of them (48.6%) had 3–5 years experiences in PPP projects.

4.0 Environmental Consideration Infrastructure Projects under PPP

It is of extreme importance that PPP projects are implemented based on environmental regulations and restrictions (Lei & Chua, 2018). Such projects that meet environmental regulations can be referred to as green PPP projects. These regulations are most often enforced by the public sector and some private agencies are working as non-profit organizations.

4.1 Environmental Approvals for PPP Projects

Respondents were asked whether PPP projects end up meeting the minimum requirements for environmental approvals. Most of the respondents, about 95% responses as "yes" and only 5% as "no" which are illustrated in figure 1.

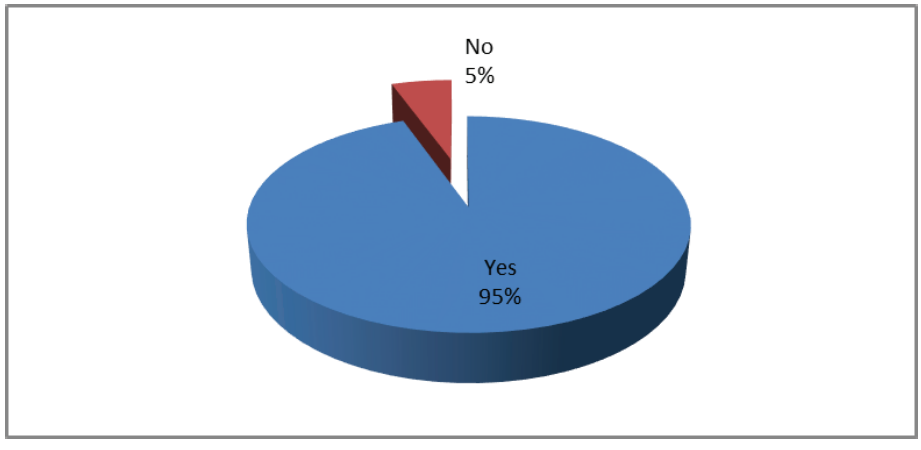

Figure 1: Do PPP projects end up meeting the minimum requirement for environmental approval?

4.2 Environmental Impact Assessment (EIA) for Infrastructure under PPP Project

Environmental Impact Assessment (EIA) is a tool used to identify the environmental, social and economic impacts of a project prior to decision making which leads the selection of the projects on the principle of sustainable development so that the adverse effects of the new developments are mitigated through proactive and rational decisions making (Shah et al. 2010). Bangladesh initiated EIA guidelines in 1992 for water sector development. Bangladesh endorsed EIA legislation in 1995 and EIA rules in 1997 and presently, most of the donor agencies working here have their own EIA guidelines. The guidelines developed by the Bangladesh government and the donor agencies are stringent (Momtaz, 2002), but there is less emphasis on monitoring. He also reported that most of the cases EIA are largely dependent on the requirements of the donor agencies. There is some gap among inter-organizational coordination involve in the environmental decision making process and inadequate infrastructure facilities for ensuring proper EIA in Bangladesh.

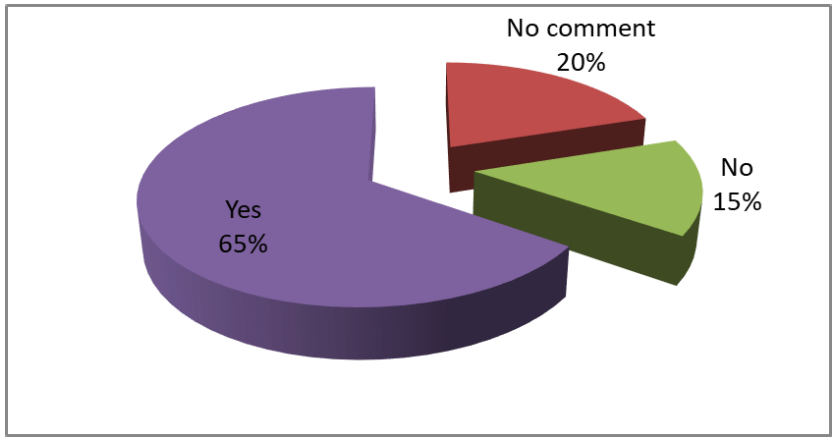

Figure 2: Environmental Impact Assessment (EIA) for infrastructure

To establish infrastructure, EIA has been practised scatterly in the developing countries and particularly in South Asian Nations (Shah et al. 2010). However, in the last few years, Governments, environmentalists, researchers, media and communities of these countries have formulated sufficient legislative and institutional frameworks for the EIA. The findings indicate that 65% of the respondents had opined that EIA for the infrastructure project under PPP was conducted before establishing the projects whereas 20% had no comments and 15% of respondents oppose the statement.

5.0 Status of EIA system for Infrastructure Projects under PPP

For screening out of a project, EIA is the foremost steps in Bangladesh. This is carried out based on the screening list included in the Environment Conservation Act, 1995 and Environment Conservation Rules, 1997. A project that requires a detailed EIA undergoes an IEE (Initial Environmental Examination) at first. Moreover, an IEE is of no use in the decision-making process where an EIA is needed. The major steps need to be followed in an EIA before starting any infrastructure projects are presented into table 3.

Table 3: Steps of EIA being followed before starting an Infrastructure Project

Sl. no.	Steps	Percent Respondent		
		Not at all	Partially followed	Properly followed
1	Procedures for update and review of environmental management instruments	34.55	49.09	16.36
2	Compliance audits	34.6	58.2	7.3
3	Provision of audits to Defence; and	34.55	60.00	5.45
4	Procedures for notification of Defence and relevant authorities in the event of environmental incidents.	41.82	52.73	5.45

The present EIA process in Bangladesh aims to develop some environmental management activities and mitigation measures for development activities. The EIA processes are undergoing some steps. In the study, it was found that most of the respondents near 50% opined that the steps of EIA being partially followed before starting an infrastructure project under PPP and only a few respondents stated that the procedure and steps of EIA had been properly followed as illustrated into the table 3. Above quarter percent of the respondents opined that the procedure and steps of EIA are not followed at all. Ahmad and Ferdausi 2016 stated that EIA had been practised in Bangladesh since the late 1980s, but it is through the enactment of the Environment Conservation Act, 1995 and the Environment Conservation Rules, 1997 EIA gained formal status in the country. They also reported that effective EIA would be holistically intertwined with the country's legal system and backed by a clear set of administrative protocols with sufficient institutional capacity. Some evidence suggests that EIA has not yet evolved satisfactorily in Bangladesh in several aspects. It is widely speculated that in Bangladesh, EIA remains an instrument for project approval and not a tool that can promote the environmental sustainability of the project (Kabir & Momtaz, 2013; Momtaz, 2002).

EIA system assessment for infrastructure project under PPP, evaluative criteria developed by Wood (1995), modified by Annandale (2001) was used. Ahmad and Ferdausi (2016) also used Annandale's modified Wood criteria to evaluate EIA system in Bangladesh. This modified system of evaluation regrouped Wood's 14 criteria into seven categories, such as legal/administrative backing, preliminary assessment, detailed assessment, EIA study review, decision-making, follow-up and administrative support (Annandle, 2001). The opinions of the respondents on the mentioned criteria are presented into table 4.

Table 4: Do the PPP Projects follow the Evaluation Principle of EIA for Infrastructure?

Sl. no.	Evaluative principles	Percent Respondents		
		Not at all	Partially followed	Properly followed
1.	Legal/ administrative backing	0.00	17.14	82.86
2.	Preliminary assessment	5.71	20.00	74.29
3.	Detailed assessment	5.71	65.71	28.57
4.	EIA study review	8.57	77.14	14.29
5.	Decision making	11.43	54.29	34.29
6.	Follow-up	20.00	48.57	31.43
7.	Administrative support	25.71	45.71	28.57

Quality of the EIA process for infrastructure projects under PPP in Bangladesh still unsatisfactory. According to the respondents, most of the evaluating principles are partially follows during EIA for infrastructure projects under PPP. They stated the reasons behind that - inadequate study time, lack of baseline data, weak EIA teams, lack of EIA experts, inadequate funds, corruption and weak Terms of Reference by DoE.

Momtaz (2002) observed that a lack of skilled professionals in DoE for judging Environmental Statement (ES) and implementing mitigation measures and the presence of dual standards (i.e. donor and DoE). Moreover, there is no mechanism in place to ensure the monitoring of project impacts to identify and rectify impacts that were not picked up by the EIA and absence of EIA compliance and monitoring within the legislation (Ahammed & Harvey 2004). Still, there is no provision or legal binding either on DoE or the proponents to follow-up the approved plan or implementation of mitigation measures (Kabir, 2012; Momtaz & Kabir, 2013). Other findings pointed that scoping at the initial stage is not clear to the individuals and groups involved in the process of EIA (Ahammed and Harvey 2004) and need to create clear guidelines for spelling out the procedures and steps of EIA legislation (ECA, 1995 & ECR, 1997) which is also supported by Kabir (2012) and Momtaz & Kabir (2013). Kabir, *et al.,* (2010) and Kabir & Momtaz (2012; 2013) also reported that through a couple of studies explored the quality of ES (Environmental Statement) of Bangladesh deteriorating the Effectiveness of EIA.

Momtaz (2002) observed proponents hire consultants to conduct EIA in Bangladesh. They intend to get an EIA done that would highlight the benefits and justify the proposal to obtain environmental clearance from the DoE or the donor agencies for fund clearance.

Unfortunately, it is a job of the consultants to satisfy the proponent's requirements rather than carrying out EIA's objective to ensure environmental and social soundness of projects. Besides, there are no codes of conduct by which the activities of the consultants are governed. According to Ahammed & Harvey (2004) EIA as a permission seeking tool not a way to reduce the impact for the betterment of the environment; this way neglecting the intrinsic value of EIA. They also suggest the necessity of independent bodies to conduct EIA in Bangladesh.

EIA practice in Bangladesh in most cases is donor-funded and resource-intensive (Momtaz, 2002). There is a need to develop simplified EIA procedures that would be consistent with the availability of resources within the country (Shakil & Ananya, 2015). Moreover, dependence on donor agencies to meet the cost of EIA undermines the whole idea of using EIA as a tool for sustainable development.

Alshuwaikhat, *et al.,* (2007) reported that wider practice of EIA through ECR, 1997 acted as a catalyst behind the inclusion of EIA guideline for water resource management project (WARPO, MoWR, GoB, 2005) under National Water Management Plan. Fortunately, recent mass protest against the 'poor and intentional' EIA of 'Coal Based Thermal Power Plant at Sundarban' (the largest mangrove forest of the world and an UNESCO heritage site), Bangladesh is a sign of people's awareness about EIA (Muhammad, 2013). The wide practice of EIA and its significance within the decision making system, brought this change in people's value system about environment and sustainability definition as a whole (Shakil & Ananya, 2015).

6.0 Strategies for Improvement of EIA for Infrastructure Projects under PPP

The development through PPP has promising benefits for safeguarding environmental interests and improving the EIA process by applying knowledge about construction and management. EIA should influence PPP projects by providing environmental information during all planning stages which also influence the practice of EIA for infrastructure. Well-applied PPPs may provide a source of innovation within EIA practice for "re-inventing EIA" (Faith-Ell and Arts, 2009). PPP is not a panacea for all EIA problems. It is a complex phenomenon, which needs careful monitoring and discussion by EIA practitioners to enhance learning and solve the various issues (Faith-Ell and Arts, 2009). In this study, the respondents suggested some strategies to improve the effectiveness of EIA for infrastructure projects under PPP are presented in table 5.

Table 5: Strategies suggested by the Respondents for Improvement of EIA for infrastructure under PPP

Sl.	Strategies suggested for improvement	% of Respondents	Comments
1	The EIA legislation (ECA, 1995 and ECR, 1997) should be amended to include the stages of the EIA process	82.86	*(Multiple responses) Total frequencies are higher than total sample size indicating that some respondents suggested more than one strategies
2	Coordination among the concerned agencies and put forward a unified guideline for EIA sensitive to the socio, economic and political context	77.14	
3	Need to judge the ES by independent reviewer bodies to achieve the inherent goal of EIA	88.57	
4	Create a corruption-free and flexible administrative mechanism of government for effective EIA	91.43	
5	Capacity building at various le vels both within and outside the government involved in EIA for infrastructure under PPP	74.29	
6	Need to build the capability of the DoE staff in impact predi ction and IEE/EIA review and to establish a strong enforcement practice	94.29	
7	MoEF/DoE shoul d establish formal linkages with universities, research organizations, and NGOs within the county to share expertise	60.00	
8	Provision of EIAs for the extension of any infrastructure project and the review process of EIA reports	40.00	
9	Consultation with local people and their representation in the project development process	20.00	
10	Ensure people participations	22.86	

Majorities of the respondents believe that capacity building of the staff of DoE in impact prediction and Initial Environmental Examination (IEE)/EIA review and to establish a strong enforcement practice (94.39%) and Creation of a corruption-free and flexible administrative mechanism of government (91.43%) for effective EIA will be helpful for EIA process in infrastructure projects under PPP. Besides these, the judgment of ES by independent reviewer bodies (88.57%) to achieve the inherent goal of EIA, amended of EIA legislation to include the stages of the EIA process (82.86%), coordination among the concerned agencies (77.14%), capacity building at various levels both within and outside the government (74.29%) involved in EIA for infrastructure under PPP and MoEF/DoE should establish formal linkages (60%) with universities, research organizations, and NGOs within the county to share expertise. The similar result observed by Kabir (2012)and Momtaz & Kabir (2013) in the effectiveness of EIA. According to them the EIA legislation (ECA, 1995 & ECR, 1997) should be amended to include the stages of the EIA process (scoping, analysis of alternatives, evaluation of impacts and contents of an ES) and other requirements such as the provision of EIAs for the extension of project and the review process of EIA reports.

There is a need for coordination among the concerned agencies and put forward a unified guideline for EIA sensitive to the socio, economic and political context of Bangladesh. Moreover, consultation with local people and their representation in the project development process has been suggested to ensure better decision making (Momtaz, 2002). Ahammed & Harvey (2004) stated that restructuring of the DoE and increase the manpower is essential although there are financial constraints for the government. They also highlighted to build the capability of the DoE staff in impact prediction and IEE/EIA review and to establish a strong enforcement practice. They identified the need for establishing a formal linkage with universities, research organizations, and NGOs within the county to share expertise.

Alshuwaikhat et al. (2007) proposed the introduction of Strategic Environmental Assessment (SEA) in Bangladesh where major development programs are being implemented by several local and international agencies. It is helpful for decision-makers with more time to consider environmental consequences at an early stage. SEA would also allow the consideration of the cumulative impacts of various projects.

Shakil & Ananya (2015) explain the effectiveness of the Bangladesh EIA system has been explored with the help of some criteria. According to them, procedural ineffectiveness seeks government measures in a couple of areas mainly through institutional arrangement and capacity building. Moreover, Substantive ineffectiveness reflects the global trend of failure to influence the development decision truly. Ironically, transactive effectiveness will be far-reaching for a country like Bangladesh, dependent on foreign aid largely and normative effectiveness is still little known, but mass awareness about the environment through the debate regarding an ES report is a recent experience.

7.0 Environmental Management, Mitigation and Monitoring Plan in PPP Projects for Sustainable Infrastructure Development

The construction of any project will directly impact the surrounding environment, as well as have potential climatic impacts, and some of the environmental impacts will only become known after a project becomes operational (Bhattacharyay et al. 2006). Project managers, therefore, need to anticipate the project's environmental impacts in the preparatory stage, as well as be ready to respond to environmental effects during the project's operation (Zhang, 2011). Depending on its scale, type, and location, a cross-border infrastructure project can have environmental impacts that extend beyond the project level and into the national, sub-regional, or even global level. So every infrastructure project has its Environmental Management, Mitigation and Monitoring Plan in PPP Projects for Sustainable Infrastructure Development.

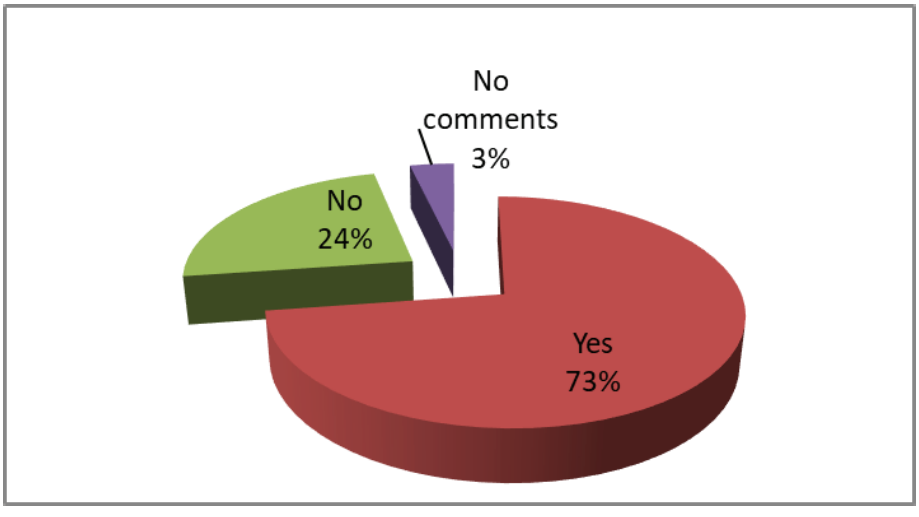

Figure 3: Are there a specific Environmental Management and Mitigation Plan (EMP)?

Respondents were asked if their organizations had specific environmental management and mitigation plan (EMP) for projects which were to be implemented through PPP. There were mixed responses to the question, as shown in Figure 3. More than half of the respondents (73%) stated that PPP infrastructure projects have specific environmental management and mitigation plan (EMP). This emphasizes the need for organization, companies and agencies to follow specific environmental management plan (EMP) for implementing PPP projects. This EMP will help increase the efficiency and sustainability of PPP projects.

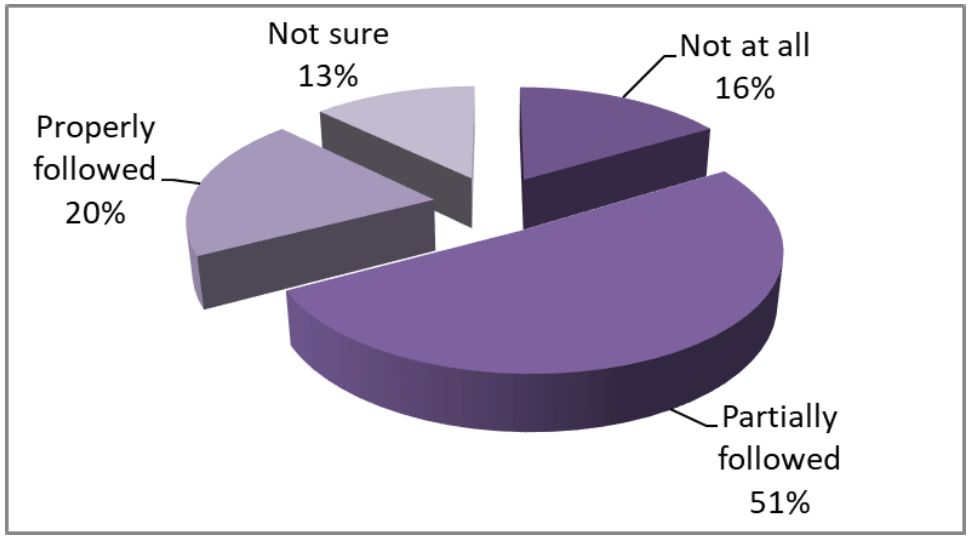

Figure 4: Did the specific environmental plan follow properly?

Respondents were asked either their organization follow the environmental plan properly. As illustrated in figure 4 more than half of the respondents responded as being partially followed, and 20% responded as properly followed.

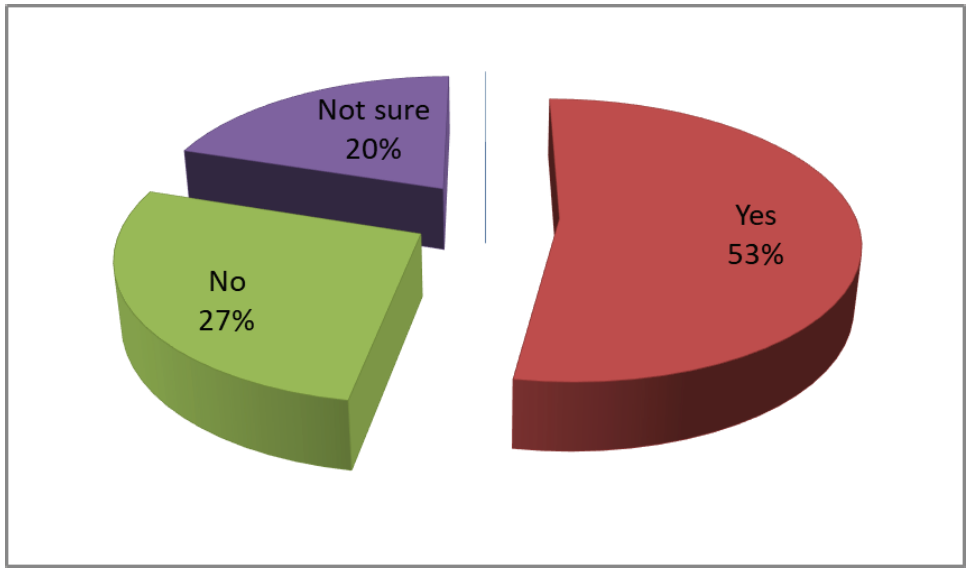

Figure 5: Do the PPP Projects have any Environmental Monitoring Plan?

The respondents were asked about their environmental monitoring plan, either their organization follows or not. The opinions of the respondents were illustrated in Figure 5.

Evidence suggested that there are some shortcomings in the EIA system in practice infrastructure projects. Despite the many shortcomings, the basic structure of the Bangladesh EIA system can be considered to be sound. The country needs to improve on these limitations to build a robust EIA system for sustainable development. Although a rigorous administrative procedure of submission and approval of necessary environmental documents are in place, evidence suggests that EIA has not yet evolved satisfactorily in Bangladesh (Ahmad & Ferdausi, 2016).

8.0 Basic Environmental protection measure adopting the Infrastructure Project under PPP Arrangement

Green infrastructure is essential for sustainable development. Infrastructure constraints limit productivity and access to jobs, markets, healthcare and education, while quality infrastructure propels economic growth and social well-being (Brauch, 2017). Sustainable Development Goal (SDG)-9 "build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation"- expressly recognizes infrastructure as a key driver of sustainable development (United Nations, 2017). For achieving the SDG11 (make cities and human settlements, safe, resilient and sustainable) it is essential to invest in green Infrastructure development which also helpful to achieve SDG 13 (take urgent action to combat climate change and its impacts) and others (Casier, 2015). Both in mitigating greenhouse gas emissions and in adapting to the effects of climate change, the success of the Paris Agreement on Climate Change depends heavily on infrastructure investment (Brauch 2017, Garemo et al. 2016; New Climate Economy [NCE], 2016; Vaughan, 2017). Sustainable infrastructure is not only needed for the betterment of people and the environment but also makes business sense (International Institute for Sustainable Development [IISD], 2017; International Finance Corporation [IFC], 2017; Global Infrastructure Basel [GIB] Foundation, 2017). Sustainable infrastructure refers to infrastructure projects that are economically, socially and environmentally sustainable (Bhattacharya et al., 2016; Bielenberg et al. 2016). According to Brauch (2017), environmentally sustainable infrastructure is expected to:

- Limit and lower air, water, soil and all other forms of pollution.
- Provide for the stewardship of ecosystems.
- Contribute to ecosystem and biodiversity management and conservation.
- Enhance ecosystem services provided by green infrastructure.
- Promote and use clean and environment-friendly technologies.
- Support the conservation and the sustainable and efficient use of natural resources, including water, energy and materials.

Contracts for sustainable Infrastructure, particularly regarding climate change mitigation and adaptation goals, environmentally sustainable infrastructure (Brauch, 2017) is expected to:

a. Mitigate greenhouse gas emissions, consistent with the climate change goal under the Paris Agreement.
b. Contribute to the transition to a low-carbon economy and to the de-carbonization of the energy system (that is, moving away from fossil fuels and toward renewable energy: solar, wind, biomass and hydropower).
c. Utilize and promote high energy-efficiency standards.
d. Be resilient to and help protect against extreme weather events and other natural disasters (such as earthquakes, floods, droughts and extreme heat) as well as these and other climate change-related impacts (including sea-level rise).
e. Consider climate change risks in its design, maintenance and operation.
f. Reduce vulnerability to climate change risks and impacts.

To achieve the SDGs and climate change objectives, the infrastructure upgraded and built must be sustainable one so that it would be specifically designed to mitigate economic, social and environmental risks, and to generate economic, social and environmental co-benefits (Brauch, 2017).

The environmental aspects need to adopt in infrastructure project under PPP arrangement are presented in table 6.

The respondents were asked to rate the environmental aspects adopting an infrastructure project under the PPP arrangement illustrated (table 6). More than 50% of the respondent stated that infrastructure projects poorly reduce air, water, soil and all other forms of pollution as well as poorly promote and use environment-friendly technologies. On the other hand, the projects not at all provide for the stewardship of ecosystems and biodiversity conservation. Most of the respondents rate other environmental considerations as fair followed by poor.

Table 6: Environmental aspects adopting an Infrastructure project under PPP Arrangement

Sl. No	Statements	Percent respondent opinion					
		Not At All	Poor	Fair	Moderate	Good	Very good
1.	Do the projects reduce air, water, soil and all other forms of pollution?	30.91	47.27	9.09	5.45	3.64	3.64
2.	Do the projects promote and use environment-friendly technologies?	12.73	74.55	5.45	3.64	1.82	1.82
3.	Do the projects provide for the stewardship of ecosystems?	61.82	23.64	5.45	5.45	3.64	0
4.	Do the projects contribute to ecosystem and biodiversity management and conservation?	60.00	25.45	3.64	3.64	3.64	3.64
5.	Do the projects mitigate greenhouse gas emissions during construction and maintenances?	5.45	5.45	70.91	9.09	7.27	1.82
6.	Do the projects use of resilient technologies against natural disasters like earthquakes, floods, droughts and extreme heat etc.?	3.64	5.45	27.27	43.64	12.73	7.27
7.	Do the projects consider climate change risks in its design, maintenance and operation?	12.73	10.91	20.00	36.36	14.55	5.45
8.	Do the project's contracts for sustainable infrastructure?	34.29	22.86	25.71	11.43	5.71	34.29
9.	Do the projects Reduce vulnerability to climate change risks and impacts.	25.71	31.43	22.86	11.43	8.57	25.71
10.	Do the projects Enhance ecosystem services provided by green infrastructure.	34.29	28.57	20.00	11.43	5.71	34.29

Source: Authors own survey-2018/19

9.0 Conclusion and Recommendations

With the development of the economy in our country, the pollution situation of the domestic environment is becoming more and more serious. Although the Bangladesh Government's financial investment is increasing, there is still a big gap between pollution control goals and environmental protection needs to mitigate the existing risk.

EIA in infrastructure projects aims to predict the environmental impacts of the developmental activities at an early stage in project planning & designing to find ways and means to reduce their adverse impacts, shape projects to suit the environment. The results of the study reveal that most of the infrastructure projects under PPP don't follow the proper guidelines of EIA and most of the projects have a paper-based environmental hazard mitigation plan but not in practices. Moreover, to maintain environmental sustainability, EIA and EMP would be properly guided for

sustainable development. Proper monitoring plan for mitigating environmental degradation now a prime need for infrastructure projects under PPP. A sustainable built environment requires equitable use of natural resources to provide modern facilities to the people for their socio-economic development. The developing country like Bangladesh require more physical development for their economic uplift and alleviation of poverty, but the principles of sustainable development need to be perfectly followed. Despite visible changes in the attitudes of the legislature, policymakers, media people and general public towards environmental improvement, there is a need for more funding and support for the concerned organization for the improvement in the human resources and equipment for better compliance towards the commitments in the EIA for infrastructure projects. Governments need to establish national environmental strategies through Strategic Environmental Assessments or similar documents with implementation and follow-up. Strengthening national environmental management capacity will mitigate damage and promote a better environment. Besides this, the establishment of a market mechanism to attract social capital into the ecological environment protection in infrastructure projects and to carry out the innovation of environmental protection investment and financing, PPP mode has become a new type of cooperative organization relationship model of ecological environment governance for Bangladesh. Furthermore, to make EIA contribute to sustainable development through harnessing its full potential at the local levels, corporate social responsibility (CSR) should be integrated into or linked to (Betey & Godfred, 2013) the EIA process and strength the monitoring system.

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