

Reforms in Engineering Education for Sustainable Development: A Study on Engineering Education in Bangladesh

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Abstract

Transparency, accountability and efficiency in management and administration is vital requirement for sustainable development in all sectors of developing countries. As the higher education sector is providing human resources to serve in all other sectors, it must produce professionally skilled, morally developed, honest, sincere and responsible human resources for sustainable development. But the higher education sector of Bangladesh is found to be not successful in producing expected human resources and engineering universities being major component of this sector are more responsible for producing expected human resources for sustainable development. This paper presents a systematic study and some significant suggestions in management, administration and curriculum systems for production of professionally skilled, morally developed, honest, sincere and responsible human resources for sustainable development. Participant observation method, case study method and questionnaire technique of survey method are used to collect primary data from respondents involved in teaching, research, management and administration of public universities and also involved in other sectors. Author has been involved in management, administration and curriculum systems of DUET for the last 29 years as participant and case study observer. Suggestions presented in this paper will be helpful for all developing countries and also for sustainable & peaceful world.

1. Introduction

As a developing country, Bangladesh utilizes approximately 75% of national budget in development projects. This huge amount of national budget has been used for sustainable development of Bangladesh through procurement of goods, works and services and it is found that 80% of human resources involved are engineers.. Transparency, accountability and efficiency in management and administration is vital requirement for sustainable development in all sectors of developing countries. The engineering education sector is providing engineers to serve in all other sectors, so it must produce professionally skilled, morally developed, honest, sincere and responsible engineers for sustainable development. But the engineering education sector of Bangladesh is found to be not successful in producing expected human resources. On the other hand, transparency, accountability and efficiency in management and administration promise significant benefits for sustainable development in Bangladesh. These include economy and efficiency in public procurement leading to timely and cost effective implementation of development projects [2]. It has the potential for enhancing Bangladesh's aid utilization capacity, creating opportunities for increasing foreign aids, reducing cost of doing business in Bangladesh and improving investment climate, for the better interest of the state as well as the people or mankind. It offers a promise for developing the capacity of domestic contracting and consulting industries/firms for entry into the regional and global markets [2]. To achieve such a goal, GoB, as a part of Public Procurement reform activities, developed and implemented PPR-03 in 2003, PPA-06, PPR-08 and PPR-11. But expected goal is not yet achieved. This paper presents a systematic study and some significant suggestions on management, administration and curriculum systems for production of professionally skilled, morally developed, honest, sincere and responsible engineers for sustainable development.

2. Methodology

Participant Observation Method, Case Study Method and Questionnaire techniques of Survey Method are used to collect primary data from, Dhaka University of Engineering & Technology and other Engineering Universities in Bangladesh. As an educationist and member of TEC/PEC and consultant to many engineering projects, participant observation and case study methods had been used to know activities, involvement, morality, honesty, sincerity, skillness and professionalism of engineers for the last twenty years. Qualitative outcomes from this long study is incorporated in construction of questionnaire. Following steps are followed in construction of questionnaire [4].

- (i) As per definition of the problem to be investigated, data requirements is fixed. And qualitative outcomes from case study and participant observation are incorporated.
- (ii) Type of questionnaire (closed/open ended) is decided.

- (iii) Topics of questionnaire are outlined and questions are written on three areas; general queries on PPR, drawbacks of PPM, suggestions for developing Capacity Building for Sustainable Development in Bangladesh [5].
- (iv) Questions are edited for technical defects or bases that reflect personal values.
- (v) Questions are pre-tested to know how well to work.
- (vi) After pretest, final edition is made of ensure that the questionnaire is ready for administration. This includes a close look at the content, sequence of questions, appearance and clarity of the procedure for using the questionnaire.
- (vii) Finally the questionnaire is formulated to make it reliable and valid. To do a satisfactory formulation job, procedural check lists are considered.

3. Questionnaire

Questionnaire technique of survey method is used to collect primary data from GoB's procurement sector. Random sampling method is used to select 50 respondents; 40 from engineering educationists and 20 from engineers and consultants engaged in development projects. For limitation of paper size, questionnaire format comprising of queries that was administered on 50 respondents is not presented.

4. Statistics of Respondents

Demographic information and statistics of respondents are shown below:

Demographic information:

1. Code No.2. Age3. Education4. Religion
5. Sex 6. Marital status: 7.Occupation

Table – 1 : Age of Respondents

Age structure	No of respondent	Percentage (%)
Age up to 40 years	5	10
Age 41 to 50 years	20	40
Age 51 to 60 years	20	40
Above 60	5	10
N	50	

Table 1 shows that age group of 41 to 60 predominating respondents

Table – 2 : Education of Respondents

Level of education		No of respondent	Percentage (%)
01	B.Sc. Engg.	10	20
02	M.Sc. Engg	15	30
03	Ph. D degree	25	50
	N	50	100

Table 2 shows that Ph.D holders are major respondents (50%) involved

Table – 3 : Religion, Marital status and Sex of Respondents

Religion, Marital status and Sex	No of respondent	Percentage (%)
Islam	46	92
Others	4	8
Married	59	98
Unmarried	1	2
Male	49	98
Female	1	2
N	50	100

Table 3 shows that Muslims, Married & Male officers are predominating.

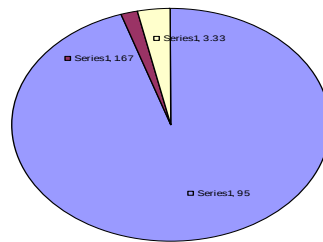
5. Empirical Outcomes

Empirical outcomes from the questionnaire administered on selected respondents are presented below(for limitation of paper size, only outcomes on queries of special importance are presented):

Q.-1 All universities should have sufficient courses (likely at least 3 courses, each having 3 credits in graduation level) on education and practices on honesty, morality and professional ethics. Course contents should be taken from religions and from life history of famous personnel of the history.

Ans.: Yes / No / Partially

Graphical Representation

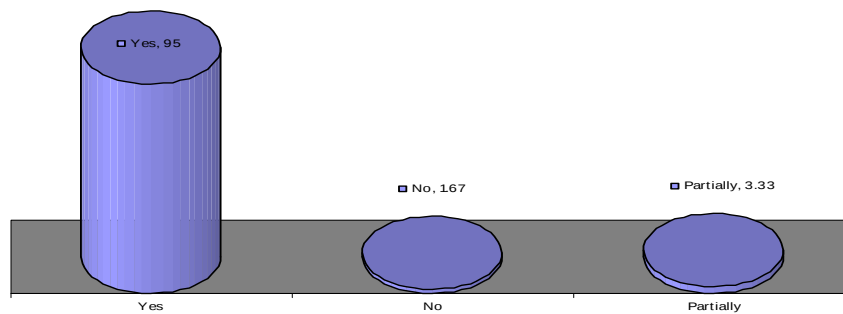


Which show that 95% of respondents are completely agreed with the suggestion of “All university should have sufficient courses (likely at least 3 courses, each having 3 credits in graduation level) on education and practices on honesty, morality and professional ethics. Course contents should be taken from religions and from life history of famous personnel of the history”.

Q.-2 As approximately 75% of national budget is utilized in development projects, and engineers are mainly involved in development project, all engineering graduation courses should include a course on Public Procurement Management.

Ans.: Yes / No/ Partially

Graphical Representation

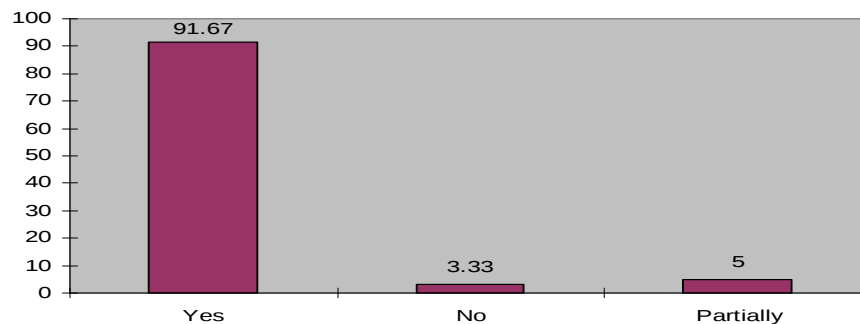


Which show that 95% of respondents are agreed with the suggestion of “All engineering graduation courses should include a course on Public Procurement Management”.

Q.-3 All universities, providing engineering graduation, must ensure educational quality and standard up to professional level. To achieve such level of standard, Universities must have co-operation with industries, so that students can conduct UG/PG research on industry’s need based projects, that is on real time project not only on academic projects.

Ans.: Yes / No/ Partially

Graphical Representation



Graph shows that 91.67% of respondents agree with the suggestion- “All universities, providing Engineering graduation, must ensure educational quality and standard up to professional level. To achieve such level of standard, universities must have co-operation with industries, so that students can conduct UG/PG research on industry’s need based projects, that is on real time project not only on academic projects”.

6. Suggestions on engineering education systems for sustainable development

As per empirical outcomes, following suggestions on management administration and curriculum systems of engineering education for sustainable development are supported by the present study:

- a) All universities should have sufficient courses (likely at least 3 courses, each having 3 credits in graduation level) on education and practices on honesty, morality and professional ethics. Course contents should be taken from religions and from life history of famous personnel of the history.
- b) As approximately 75% of national budget is utilized in development projects, and engineers are mainly involved in development projects, all engineering graduation courses should include a course on Public Procurement Management.
- c) Engineering universities must ensure educational quality and standard up to professional level. To achieve such level of standard, universities must have co-operation with industries, so that students can conduct UG/PG research on industry’s need based projects, that is on real time projects not only on academic projects.
- d) There should be a realistic plan for each engineering department so that students become familiar with implementation, installation, testing, commissioning, operation & maintenance of engineering projects.
- e) There should be regular extra curriculum activities providing scope for practices on honesty, morality and professional ethics.
- f) Students must be restricted to join national politics and provided with residential facility.
- g) University administration must be free from local political leaders.
- h) University teachers must be trained on honesty, morality, ethics, fundamental rights, judicial procedure, inquiry procedure, business correspondence, conflict management, time management, crisis management and negotiation techniques.
- i) University teachers must be provided with salary & allowances up to market value and should be honoured in national status
- j) Vice-Chancellor of all universities must be elected by teachers, officers & employees; a professor/equivalent officer having 5 votes, an assoc. prof./equ.off having 4 votes, an asstt prof/equ.off having 3 votes, a lecturer/equ.off having 2 votes and an employee having 1 voting power.

7. Conclusion

This paper presents a systematic study incorporating author’s thirty years experience as engineering educationist, system engineering & procurement specialist to development projects. Research field and findings are very much interesting and realistic to present situation and should be followed by the Government. But as an academic research work and as per strategic analysis and procedure of the research, there may be some wrong facts, findings, feelings etc. so constructive suggestions and criticisms are appreciated.

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