Chapter 13
Examining the Quality Assurance in Engineering Education in Bangladesh

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ABSTRACT

Quality assurance in higher education is a global practice. However, the quality assurance aspect in the engineering educational institutions of Bangladesh is still at the inception level. It is crucial to monitor, assess, and improve the system to make the system effective in the context of Bangladesh. This study highlights the present practice and the perception of the professionals involved with the agencies as well as the way forward to further improve the quality assurance aspects. A questionnaire survey was conducted to assess the current status of quality assurance practices in the educational institutions of Bangladesh. It is found that there is a limited scope of quality assurance in engineering education in Bangladesh. It is also revealed that there appears to be a lack of direction as there are a number of ideas for quality assurance that have a similar level of support among the respondents. There is a long way to go for the quality assurance set-up in Bangladesh to mature and be more effective.

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INTRODUCTION

The quality assurance aspect of engineering education is highly challenging and crucial in the modern era (Chowdhury et al., 2013). Under the guidance of the University Grants Commission (UGC), each higher education institution in Bangladesh has set up the Institutional Quality Assurance Cell (IQAC) to ensure the quality of higher education. Higher education institutions can achieve quality assurance in engineering education in many ways. For instance, accreditation by national and global agencies can help ensure the quality of engineering education. The Washington Accord, signed in 1989, is a multi-lateral agreement between bodies responsible for accreditation or recognition of tertiary-level engineering qualifications within their jurisdictions who have chosen to work collectively to assist the mobility of professional engineers. Ali et al. (2011) discussed the essential requirement of engineering accreditation under the Washington Accord and its benefits. They uncovered that a minimum fulfillment of the Washington Accord could render an excellent opportunity for third-world countries to provide quality engineering education. It is worth noting that quality assurance in engineering education is a continuous process and must be evaluated and updated with changing circumstances. Li and Lei (2015) studied the quality assurance mechanisms in engineering education with a case study of Purdue University in the United States of America. They found that the concept of continuous quality improvement was not well implemented in the practice of quality assurance.

As the world faces crises on multiple fronts, engineers are at the forefront of tackling the problems alongside professionals from other sectors. Disasters induced by climate change and the adaptation and mitigation of climate change are the most prominent problems, and engineers play a crucial role in solving these problems (Milovanovic et al., 2022). There is an increasing demand for sufficiently skilled engineers who can work toward sustainable development while addressing social and humanitarian needs (Smith et al., 2019). This is a significant shift from the traditional education methods that are still widely applied all across the world, particularly in developing countries (Ahmed et al., 2016).

The quality of the education that graduate engineering students have access to is also a point of major concern as the largely theoretical knowledge may not be sufficient to enter the professional field (Daun et al., 2016; Faizi & Umar, 2021). Engineering graduates need to have interdisciplinary knowledge in order to provide sustainable solutions to emerging problems (Hadgraft & Kolmos, 2020). Underpinning these transformational changes, the role of quality assurance and accreditation cannot be ignored (Chowdhury et al., 2013; Manzoor, 2017).

The engineering education system in Bangladesh possesses a similar curriculum to many other countries, yet it is not mutually recognized due to non-compliance issues related to quality assurance (Alam et al., 2016). In recent years there has been some progress in this regard. However, the mechanism set for quality assurance in Bangladesh is yet to mature, where the formal arrangements for governance and regulation are insufficient and backdated (Alam, 2020). Moreover, the lack of a robust quality assurance framework hinders progress, as Rahnuma (2020) highlights.

With this background, this paper aims to gain insight into the quality assurance agencies and their roles in Bangladesh in relation to engineering education. This is particularly important as the quality assurance aspect in the engineering educational institutions of Bangladesh is still at the inception level, and it is crucial to monitor, assess, and improve the system to make the system effective in the context of Bangladesh.

This study highlights the present practice and the perception of the professionals involved with the agencies, as well as the way forward to further improve the quality assurance aspects. This paper can help

the policymakers and professionals engaged with education quality assurance to develop a robust periodic quality assurance framework and implementation mechanism for engineering education in Bangladesh.

METHODOLOGY

The study was conducted as part of Enabling Humanitarian Attributes for Nurturing Community-based Engineering (ENHANCE) project funded by the European Union (EU). A number of Asian and European countries were part of this project, where large-scale data collection was carried out. Within the framework of ENHANCE and aiming primarily to introduce relevant and appropriate innovations in graduate engineering education in the Partner Higher Education Institutions (HEIs), an online survey was developed and circulated among the project partners and beyond at the international level. The survey was taken by 734 respondents spanning from three distinctive sectors; Higher Education, Industry and Quality Assurance. Participation in our online survey was completely voluntary. Anyone could choose to withdraw participation at any time without giving a reason by contacting one of the research team. The survey followed the ethics and deontology rules applied in the EU. Ethics approval was granted by the University of Warwick, Biomedical and Scientific Research Ethics Sub-Committee.

The online survey was addressed to three target groups; representatives from Higher Education Institutions, Quality Assurance Agencies and Industry. Each target group was asked to respond to a set of questions. The average time to complete the online questionnaire was around 11 minutes. The sample consisted of 734 respondents in total; 221 respondents from Industry, 403 respondents from Higher Education Institutions (HEIs), and 110 respondents from Quality Assurance Agencies (QAA), mainly from UK, Greece, Bangladesh, Indonesia and Vietnam.

The respondents were purposively selected so that they were affiliated with different universities in the engineering faculties, professionals from the engineering industry sector, or engineering education quality assurance agencies.

The respondents were requested to complete a questionnaire through an online medium, which had three diverging blocks. The three blocks were designed to represent the Higher Education Institutions, Industries, and Quality Assurance Agencies. The specific questions were of both closed and open-ended types to enable extracting the maximum possible insight.

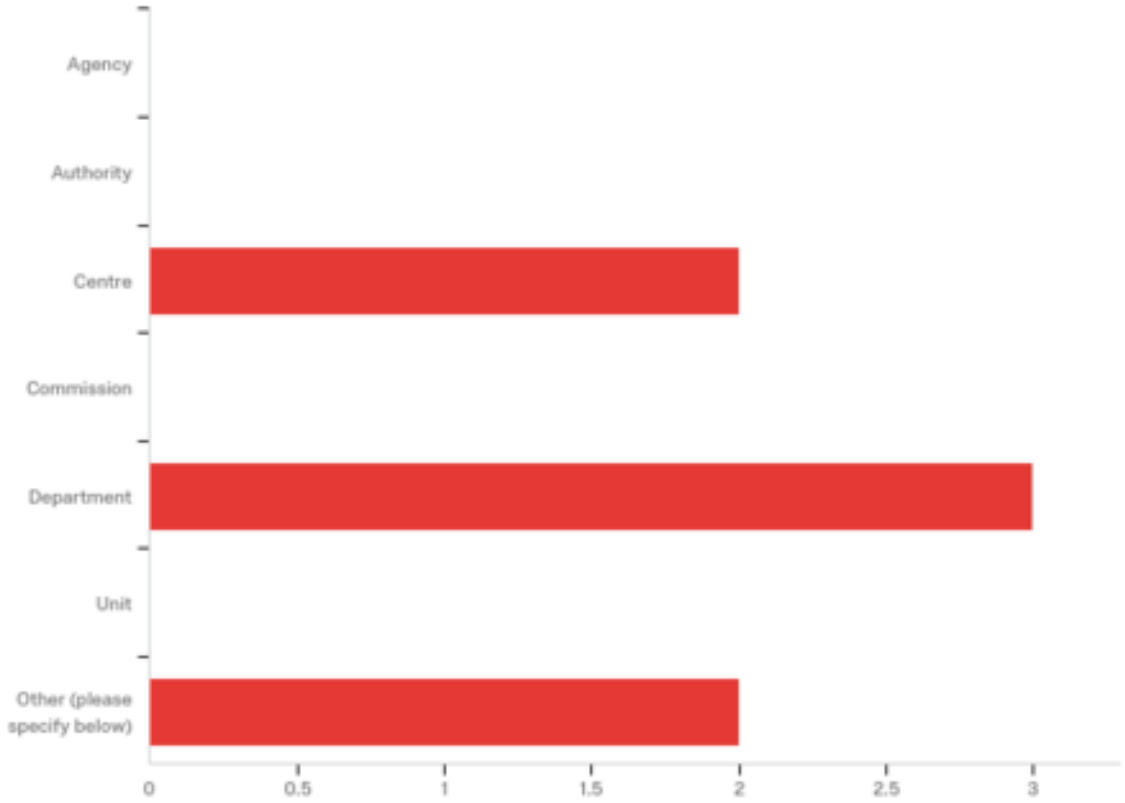
For this study focusing on Bangladesh, only the responses from the Quality Assurance Agencies of Bangladesh were selected for carrying out a simple statistical analysis. The valid, complete responses were considered for this purpose following data cleaning and sorting. The questions requiring the respondents to rank different options were analyzed based on the mean rank values assigned by all the valid responses.

A limitation of this study is the fact that the Quality Assurance of engineering education in Bangladesh is a comparatively new sector, and the availability of sufficiently experienced experts in this area in the context of the country is limited in number. However, the perception-based study in this regard with the current professionals engaged in Quality Assurance issues is very important to gauge the current situation and the way forward to develop the framework of quality assurance reviews in engineering education in Bangladesh.

Organizational Denomination

Quality Assurance in higher education being a comparatively new domain in Bangladesh with a limited scope, a total of 8 responses could be collected for this study. 42.86% of the respondents mentioned the denomination of their organization is *Department*, while 28.57% were from *Agency* denomination, as shown in Figure 1. In addition, there were denominations of *Wing*, *Research*, and *Corporation* among the respondents as well.

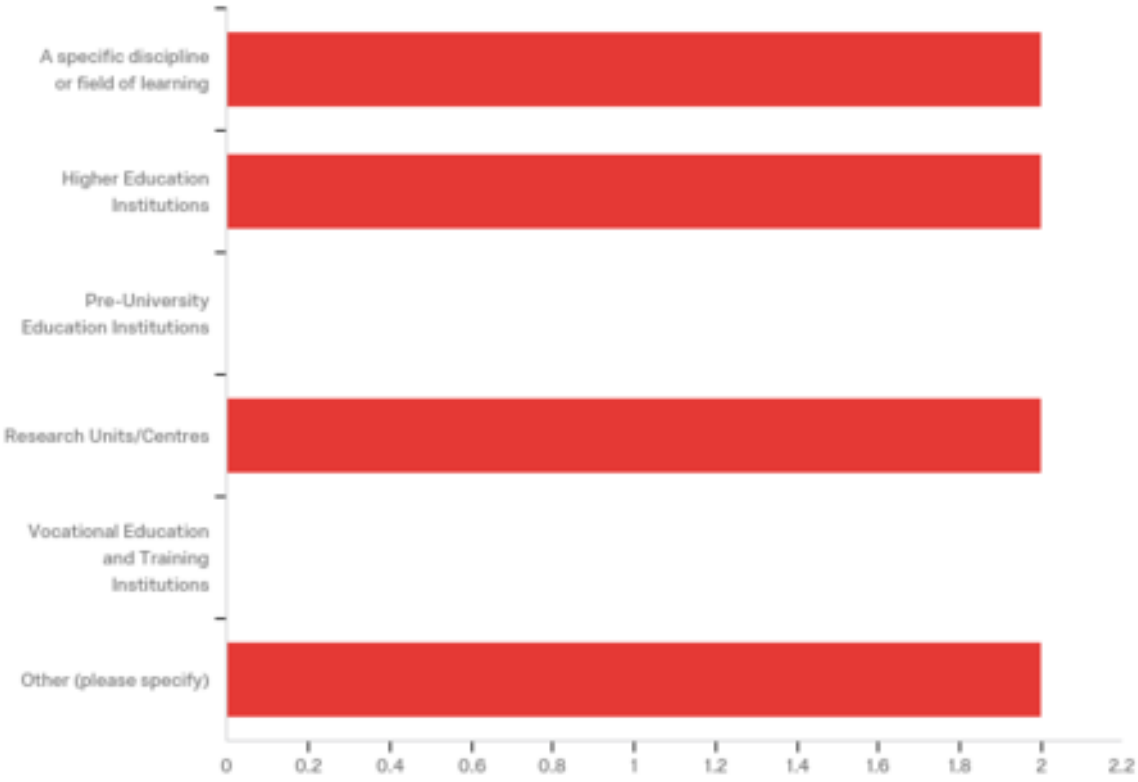
Figure 1. Organisational denomination



Scope of Quality Assurance Agencies in Bangladesh

In terms of the remit or scope of the Quality Assurance Agencies, 25% of the respondents mentioned their scope falls within *A specific discipline or field of learning*, *Higher Education Institutions*, and *Research Units/Centers* (Figure 2). In addition, two respondents mentioned about *Agricultural Development Department* and the *Implementation of research* in this regard. Specifically, the *Irrigation sector in Bangladesh* and *Civil Construction Work* were highlighted.

Figure 2. Scope of quality assurance agencies in Bangladesh



Frequency of External Quality Assurance Review

Figure 3 shows the frequency of periodical external quality assurance reviews for educational programs. 75% of the respondents mentioned that their review is done *Upon request*, while 12.50% mentioned they do it *Every 5 years*. Besides, another respondent mentioned that their organization carries out a review every year.

Consequences of External Quality Assurance Review

As for the consequences of external quality assurance review for Higher Education Institutions, 50% of the respondents mentioned that there is *No formal consequence* (Figure 4). *Approval/Licensing of a program* and *Funding/Withdrawal of funding to a program* each were highlighted by 25% of the respondents. This indicates that there is not a lot of meaningful consequence of external reviews for educational institutions.

Importance of Quality Assurance Activities

The respondents rated the importance of periodical quality review as shown in Figure 5. In their perception, the quality review is essential for *Governance and strategy* and the *Professional and pedagogical qualifications of staff* are essential, as each was highlighted by 50% of them. However, the most consensus

Figure 3. Frequency of external quality assurance review

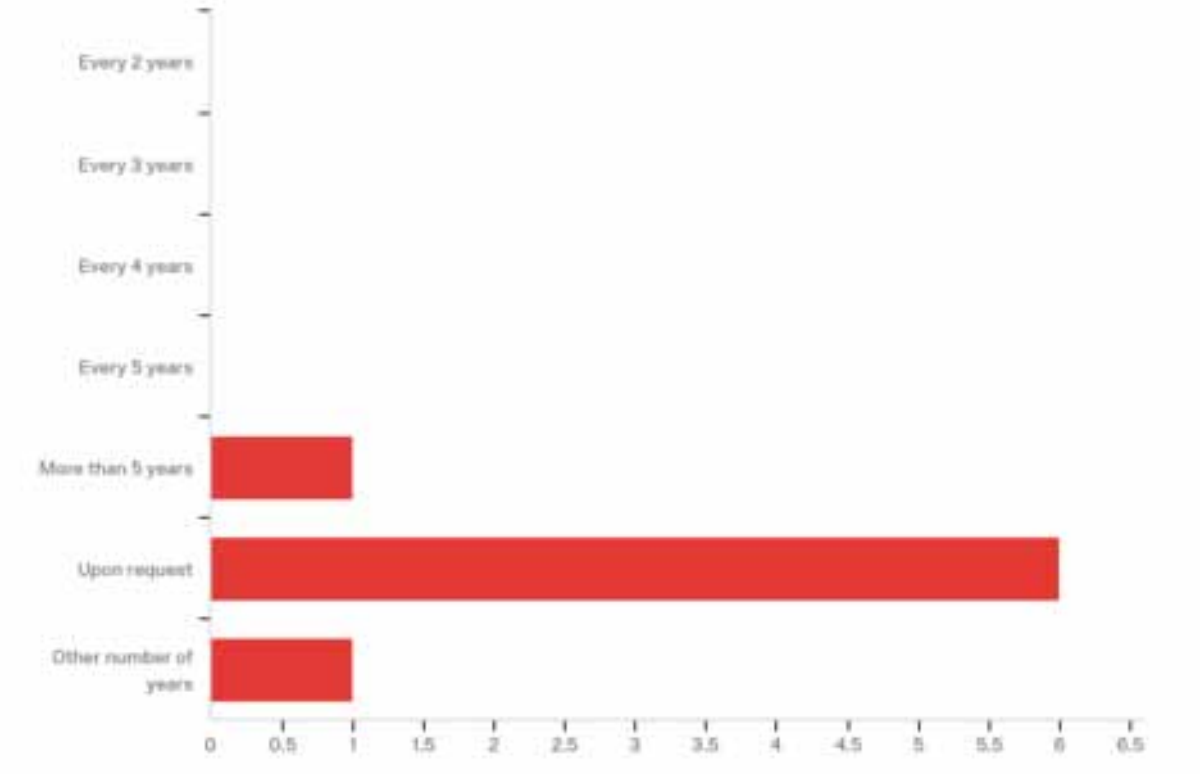


Figure 4. Formal consequences of external quality assurance review

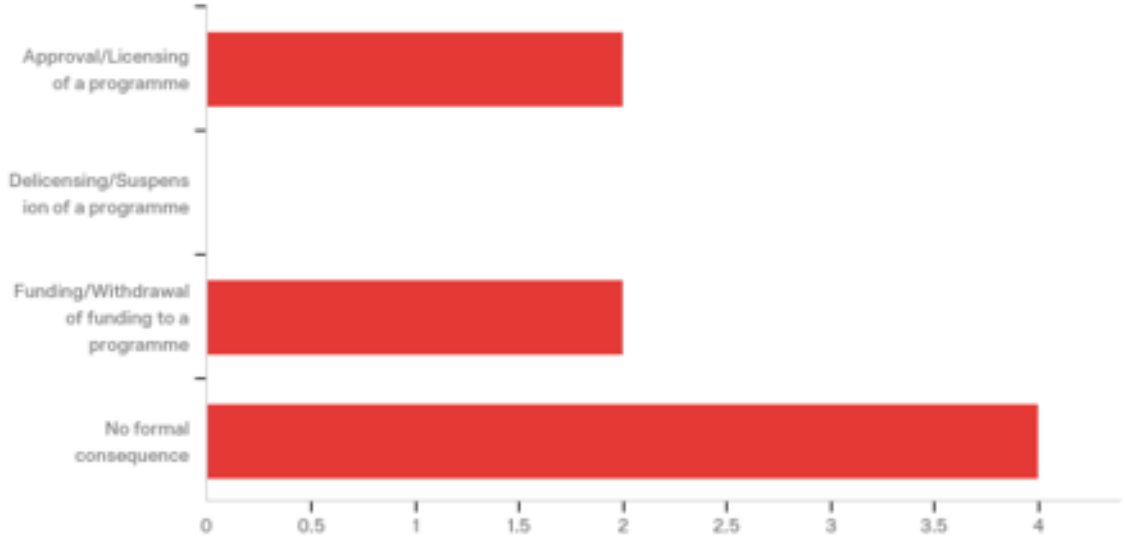
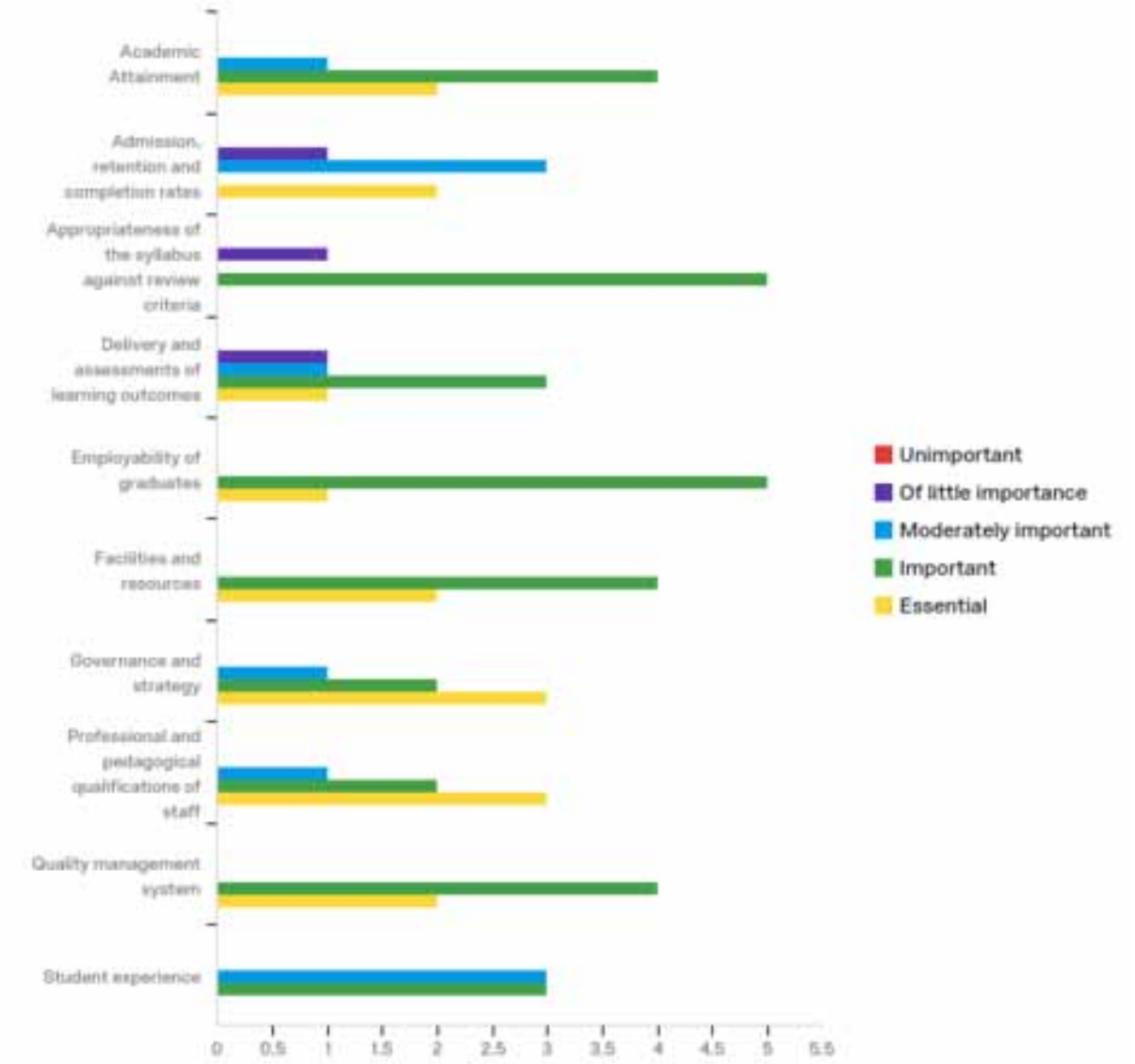


Figure 5. Importance of quality assurance activities



was found in the *Appropriateness of the syllabus against review criteria* and *Employability of graduates*, each of which was ranked *Important* by 83.33% of the respondents, while 66.67% marked *Facilities and resources* as *Important*. On the other hand, *Admission, retention and completion rates*, *Appropriateness of the syllabus against review criteria*, and *Delivery and assessments of learning outcomes* – each being ranked *Of little importance* by 16.67% of the respondents.

Models Used in Bangladesh for Quality Assurance Review

Table 1 shows the perception regarding the models/frames of reference used for the program-level periodical external quality review. The most used model was found to be *Standards and guidelines defined by*

Table 1. Models used for external quality reviews

Sl. No.	Models Used for Reviews	Percentage
1	Standards and guidelines defined by professional groups/organizations either national or international	36.36%
2	Goals and objectives set by the institution being evaluated	27.27%
3	Institutional, program and subject benchmarks	18.18%
4	Best or good practices	9.09%
5	Local regulations	9.09%
6	National framework of qualifications	0.00%

professional groups/organizations either national or international with 36.36% of the responses, closely followed by *Goals and objectives set by the institution being evaluated* with 27.27%. *Institutional, program and subject benchmarks* were highlighted by 18.18%, and *Best or good practices*, as well as *Local regulations*, were mentioned by 9.09% of the respondents. However, nobody mentioned any *National framework of qualifications* which is reflective of the lack of national guidelines in the aspect of quality assurance for educational institutions.

Responsible Authorities for New Programs

Table 2 shows the responsibility for the approval of new programs, and it is revealed that 50% of the respondents mentioned that their quality assurance agency is responsible for the approval of new programs, while the rest of the 50% mentioned they were not. It was also found that 66.67% of the respondents mentioned *The HEI is solely responsible (self-regulation)* while 33.33% mentioned *Ministry* is responsible for the approval of new programs (Table 3). This indicates that most higher education institutions approve new programs themselves – being self-regulated and, in some cases, overseen by the Ministry. The role of external agencies was found to be very limited in this regard.

Table 2. Quality assurance agency's responsibility of approving new programs

Sl. No.	QA Agency Responsibility	Percentage	Number of Responses
1	Yes	50.00%	3
2	No	50.00%	3

Panel Membership and Problematic Areas for External Quality Review

The panel membership taxonomy was found to be composed of a diverse range of backgrounds (Figure 6). 21.05% of the respondents highlighted the presence of *Field experts/practitioners* and *Representatives of professional organizations*. 15.79% mentioned *Employers* and *Higher Education and Quality Assurance Experts*. The most problematic areas for periodical external quality review were also ranked between 1 to 10, with 1 being the most problematic and 10 being the least (Table 4). It was found that

Table 3. Authority responsible for approving new programs

Sl. No.	Responsible Authority	Percentage	Number of Responses
1	Ministry	33.33%	1
2	The HEI is solely responsible (self-regulation)	66.67%	2

Community engagement strategy and *Staff qualifications* were the most problematic – each scoring a mean of 2.00. They were followed by *Research strategy* (2.67), *Practical training* (4.00), *QA management systems and structures* (4.00), *Connection between teaching and research* (4.33), and *Teaching and learning strategy and methods* (4.50). On the other hand, *Student experience* was identified as the least problematic area, with a mean score of 10.00, followed by *Admission entry requirements* (9.50). This highlights that research and training are prioritized by quality assurance agencies while the student experience is overlooked. This needs to be changed as the involvement of students can be crucial for effective quality assurance and quality enhancement (Elassy, 2013; Elassy, 2015).

Required Capacities for Quality Assurance

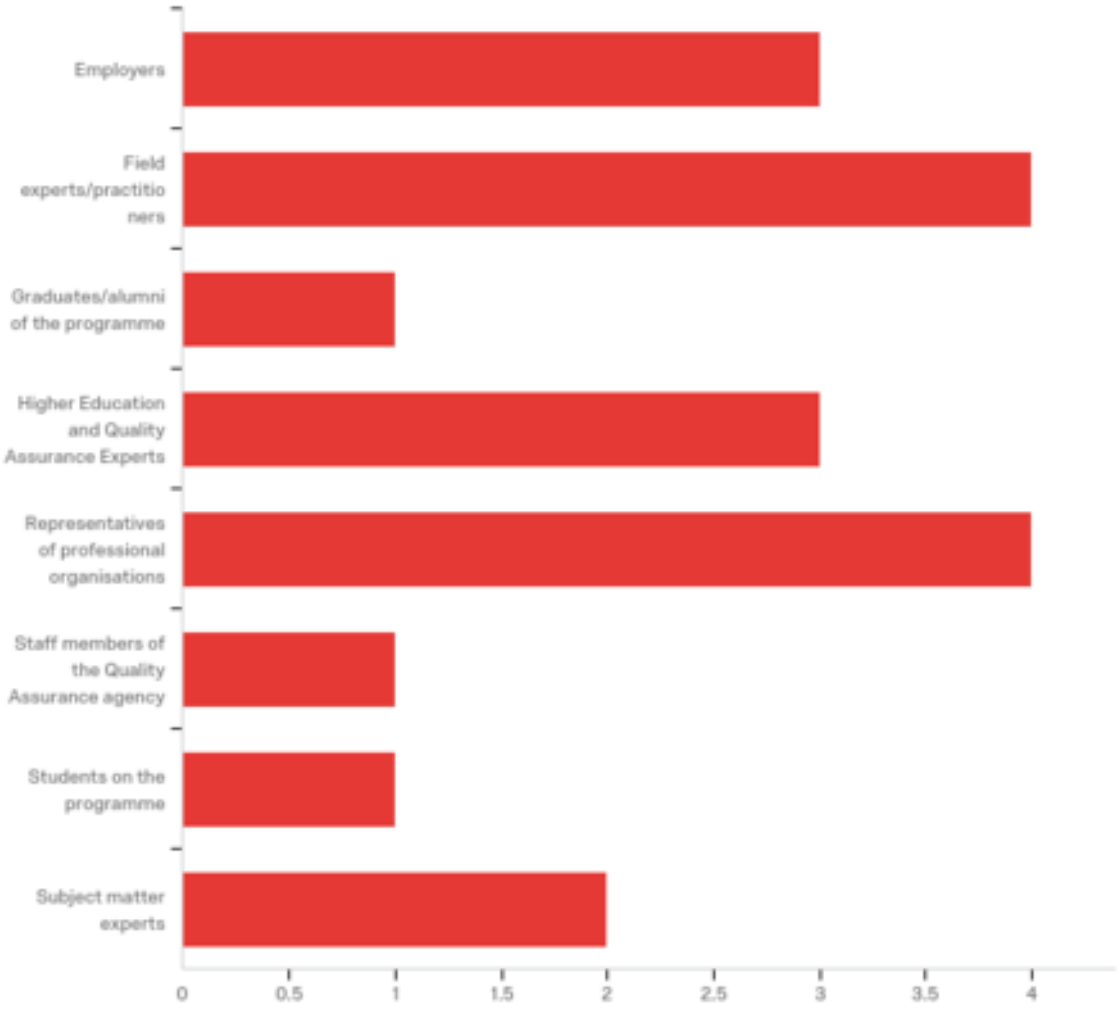
Figure 7 shows the quality assurance capacity that is most needed by Higher Education Institutions. The most important aspects were identified to be *Operational/financial planning* and *Program and curriculum benchmarking* each with 16.67% of the responses. The remaining qualities received similar attention with *Developing an assessment strategy*, *Developing and reviewing program learning outcomes*, *Developing a research strategy*, *Developing governance and strategic plans*, *Development of community engagement strategies*, *Developing teaching and learning strategies*, *Planning and developing Quality Assurance management*, and *Planning and management of facilities* all receiving 8.33% of the responses. These findings illustrate that the quality assurance aspects are very much in the inception phase in Bangladesh, and more initiatives are required to establish a pragmatic setup that is applicable and beneficial for the quality of students and HEIs in Bangladesh.

CONCLUSION

The importance of quality engineering education is evident, as engineering solutions are required to address emerging challenges around the world. However, the quality assurance framework is a new concept for Bangladesh. In conducting this study, a limited number of responses were collected, which is indicative of the limited scope of quality assurance in engineering education in Bangladesh. From the discussion of the findings, it is also revealed that there appears to be a lack of direction as there are a number of ideas for quality assurance, which have a similar level of support among the respondents. This is down to the fewer experts available and the lack of a country-wide homogeneous framework for quality assurance.

There are several aspects revealed in this study where improvements can be made. The majority of the respondents mentioned that their agency conducts external quality reviews *upon request*, instead of on a regular frequency. There also appears to be a lack of *formal consequences* while some respondents highlighted that the licensing and funding can be on the line in some instances. *Governance and*

Figure 6. Panel membership of external quality review



strategy and *Professional and pedagogical qualifications of staff* are prioritized by the current quality assurance setup, while *delivery and assessments of learning outcomes* are deemed to be of comparatively less importance. Furthermore, a number of different quality assurance models are found to be used in Bangladesh, with *standards and guidelines defined by professional groups/organizations either national or international* and *Goals and objectives set by the institution being evaluated*. On the other hand, half of the respondents mentioned the Quality Assurance Agencies were responsible for approving new programs, while the other half mentioned they were not. Those who responded that the Quality Assurance agencies were not responsible, mentioned the Ministry or the self-regulated HEIs were solely responsible for approving new programs. These reflect the lack of clarity in the quality assurance sector at this stage in Bangladesh to regulate engineering education effectively.

The external quality assurance review panel membership was found to be composed of professionals from varied background, and along with the *community engagement strategy*, *staff qualifications* was found to be one of the most problematic areas for quality assurance. To improve the situation of quality

Table 4. Problematic areas identified during external quality reviews

Sl. No.	Problematic Areas	Mean Value by the Respondents (Closer to '1' is 'More Problematic')
1	Community engagement strategy	2.00
2	Staff qualifications	2.00
3	Research strategy	2.67
4	Practical training	4.00
5	QA management systems and structures	4.00
6	Connection between teaching and research	4.33
7	Teaching and learning strategy and methods	4.50
8	Facilities and resources	5.25
9	Assessment strategy	6.33
10	Partnership with other HEIs	6.50
11	Internationalization/international partnerships	6.75
12	Program and curriculum benchmarking	7.00
13	Program intended learning outcomes	7.50
14	Employability of graduates	8.50
15	Admission entry requirements	9.50
16	Student experience	10.00

assurance in Bangladesh, the financial and operational aspects were prioritized by the respondents. Equally prioritized was the benchmarking of the programs. This reveals the need for standardizing engineering programs and ensuring an effective governance framework for the operation of the quality assurance cells.

There is a long way to go for the quality assurance setup in Bangladesh to mature and be more effective. However, the findings through studies similar to this one will be crucial to gain insight from the experience of the professionals involved to build upon the existing quality assurance setup for engineering education.

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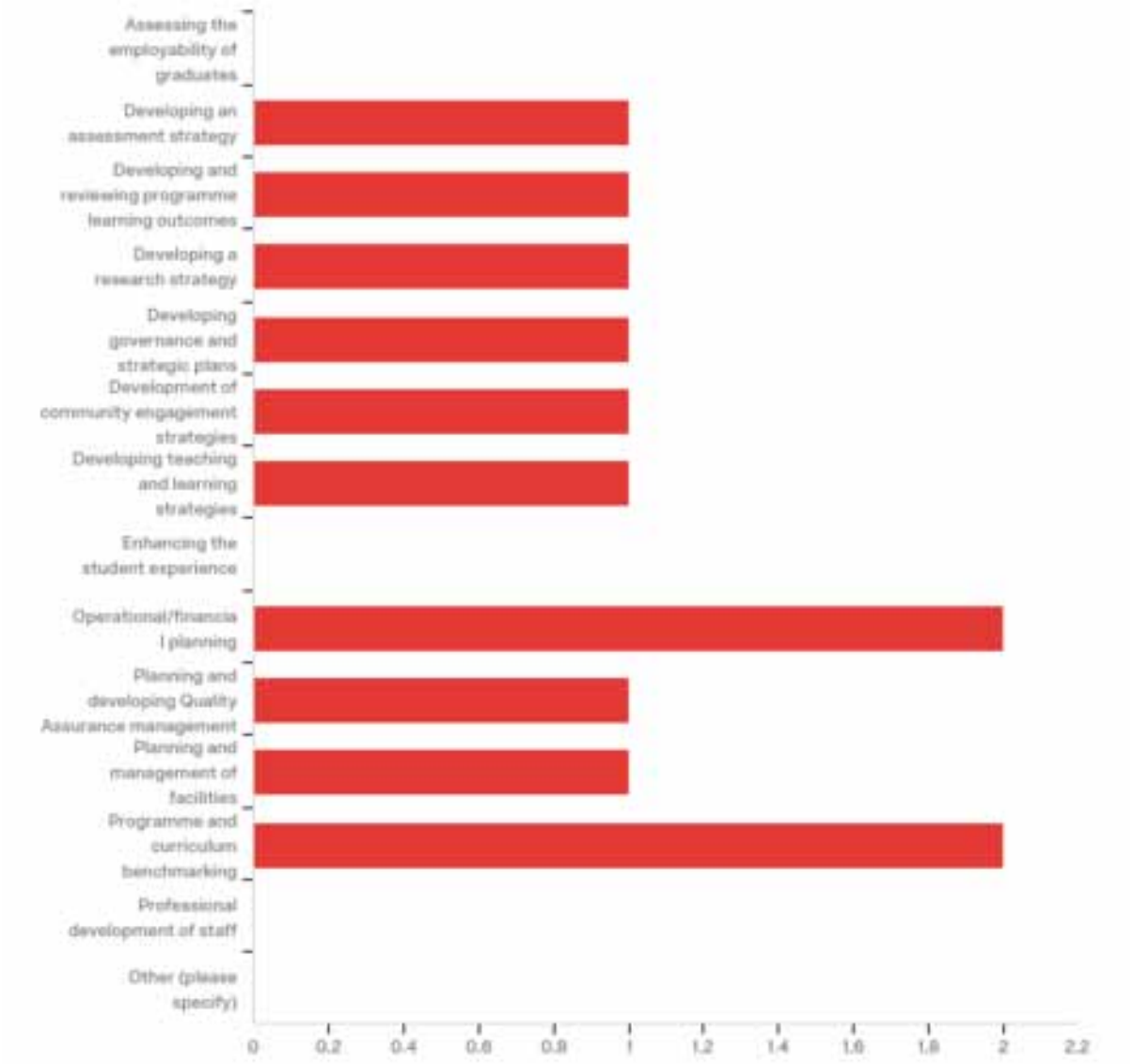
Figure 7. Most needed capacities for quality assurance



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