APPLICATION OF CLIENT'S QUANTITY SURVEYING PRACTICES IN THE POWER SECTOR IN SRI LANKA

D.G. Melagoda* and T.S. Jayawickrama

Department of Building Economics, University of Moratuwa, Sri Lanka

ABSTRACT

The effective use of Quantity Surveying practices is vital for the construction sector and its contribution to the overall economic growth and development of the country. With today's competitive economy, the profession has been identified as paramount in a broad range of development sectors. In Sri Lanka, Quantity Surveyors' involvement is limited to the construction stage of power generation and distribution projects as Consultant's Quantity Surveying and Contractor's Quantity Surveying practices. With the amplification of the power sector, cost and time overruns have been identified in power generation and distribution projects due to the absence of cost plans and the poor documentation of bids and contracts, leading to disputes, legal costs and poor administration of projects. Therefore, the involvement of Client's Quantity Surveyors in power sector projects has been identified as important. This is an emerging path for Quantity Surveyors to contribute their expertise in Sri Lankan public sector developments projects. In this context, the study investigated the applicability of client's quantity surveying practices in the Sri Lankan power sector. A mix research approach was adopted in the study including a preliminary survey and a questionnaire survey. The findings of preliminary survey were analyzed with content analysis technique. Data collected through questionnaire survey were analyzed using Relative Importance Index. It was identified that non-involvement of client's Quantity surveyors in the Sri Lankan power sector is due to the lack of recognition of the requirement of the profession in the sector and execution of duties demanding quantity surveying expertise by other professionals in the power sector.

Keywords: *Client's Quantity Surveyor; Power Sector; Quantity Surveying.*

1. INTRODUCTION

Quantity surveying as a profession offers services to clients in the construction industry (Udo and Abialo, 2015). Being an eminent profession in the construction industry, it adds value to the contractual and financial management of construction projects in all its stages (Dada & Jagboro, 2012). Once the Quantity Surveyor (QS) has been employed or commissioned by a client, he turns considerable expertise to ensure that the client gets full value for money (Wirepa, 2001).

Badu and Amoah (2004) argues that a QS is a professional in the construction industry who has the ability to analyse both cost components and physical construction works of a project in a successful way so as to be able to apply the results of his analysis in solving problems peculiar to each project. QSs work in conjunction with architects, consulting engineers and contractors safeguarding the client's interests as an independent professional with specialist skills for several centuries (Olanrewaju and Anahwe, 2015). However, the role of the QS is currently more vital than when it was originally established in England in 1785 and largely developed over the 19th century (Opawole *et al.*, 2012).

The origin of quantity surveying in Sri Lanka can be traced back to the British era. British QSs were employed during colonial period in the Public Works Department of Sri Lanka. However, during the World War II, these QSs left the country. Thereafter, Sri Lankans who had the opportunity of obtaining foreign education returned to the country and practiced as QSs (Rameezdeen & Jeyamathan, 2006). The quantity surveying profession is currently regarded as one of the well paid professions within the construction industry. The dynamic nature of the profession shapes up the skills and the competencies of the profession to cater timely demand (Thayaparan

*Corresponding Author: E-mail - dgmelagoda92@gmail.com

et al., 2011). There is a new optimism about the future of the quantity surveying profession and QSs are now seen as key players in the construction industry (Reddy, 2015).

Due to the changes in the professional structure with multidisciplinary working and the increased emphasis on continuing professional development, research and development regarding the profession of quantity surveying will play an important role the future, to apply quantity surveying expertise to new segments of construction industry (Ashworth *et al.*, 2013).

According to Ashworth, Hogg, and Higgs (2013), building work, building engineering services, civil engineering, heavy and industrial engineering are the four main areas that QSs are involved in the construction industry. QS's role is significant in industrial construction due to its changing circumstances and a greater emphasis to be placed for value for money. Works in heavy and industrial engineering includes onshore and offshore oil and gas projects, petrochemical projects, nuclear reprocessing and production facilities, process engineering projects, power stations and steel plants.

QSs are already involved in the power sector for a greater number of years in Sri Lanka, but it is limited to the construction stage of power generation and distribution in both Consultant's and Contractor's teams. Nevertheless, it has not been widened to the client QS's practices in the level of initiation of new power generation and distribution projects, maintenance activities. It can be observed that lack of involvement of client's QSs has led to a range of issues such as cost overruns due to the absence of cost plans, bills of quantities, and schedules of activities, and to disputes and legal costs driven by faulty contract documents. Therefore, the client's QS in the power sector has been identified as an emerging path where quantity surveying expertise can be incorporated in Sri Lankan public sector development projects.

Moreover, there are no studies conducted to explore the need of client's quantity surveying practices in Sri Lankan power sector. Addressing this gap and acknowledging the requirement of client's QSs in Sri Lankan power sector, this study investigated the applicability of client's quantity surveying practices in the Sri Lankan power sector.

2. LITERATURE FINDINGS

2.1. ROLE OF THE QUANTITY SURVEYOR

The QS has the utmost responsibility to address the key cost, financial and contractual issues of the construction process, which is always highly influenced by the environmental parameters, which are very sensitive to changes and are unique for every project, being one of the key professional experts in the construction (Senaratne & Sabesan, 2010). Traditionally, QSs have fulfilled the function of financial and contract controller of projects (Baloyi & Price, 2003).

According to Olatunde (2006), QSs are mostly involved with measuring and valuing of construction work being carried out under a construction contract where architect drawing are handed over to them to advise on likely costs, prepare tender documents, itemize the work to be carried out, negotiate construction contracts, value work as it proceeds and prepare final accounts which can be briefly described as a measure and value system. Moss (2004), describes the contemporary role of the QS as a 'client advocate and representative', who is proficient in construction design and economics, planning and procurement, administration and management, and project management. However, the quantity surveying profession has endeavored to broaden the role of QSs to include inter alia, project management, and facilities management in recent years (Crafford & Smallwood, 2007).

Within its contemporary role, QSs undertake a spectrum of work ranging from providing investment appraisals to construction project management (Hore *et al.,* 2009). The key role of the QS involved in the public sector is to control the public money on the way they are spent, by involving in projects of wider range of size along with maintenance and repair programs (Willis *et al.,* 1994). Therefore, QSs have realised that the acquisition of a more extensive skills set enables them to deliver greater benefits to clients, which may, in turn, lead to more work (Fanous, 2012). The technical skills possessed by QSs will not go any further without the support of soft skills (Frei *et al.,* 2013).

2.2. POWER SECTOR IN SRI LANKA

The electricity sector is dominated by the state-owned Ceylon Electricity Board (CEB) while other government and private sector organisations also have active involvements in different segments of the sector such as electricity generation and distribution in the electricity (Sri Lanka Sustainable Energy Authority, 2007). According to Energy Forum Guarantee Ltd (2006), it is currently undergoing a severe financial crisis. The root cause for this financial crisis is high generation cost of electricity. Despite being a country with one of the highest electricity tariff in the region, the CEB is not in position to recover this high generation cost. The Government envisages reaching a 100% target in country-wide electrification by 2015 (Ministry of Power and Energy, 2015). The growing electricity demand could be met only by adding adequate generation capacities, employing the most appropriate technologies in the most economical manner by supporting the long-term goals which includes increasing efficiency, quality of service and enhancing technical standards and safety of electricity industry in Sri Lanka (Asian Development Bank, 2015).

QS, identified as the cost manager, plays a critical role ensuring that clients gain value for the invested money in projects. The changes involved in the modern Quantity Surveying practices have and are resulting in adding great values to projects across different industries. Therefore, Sri Lankan power sector client requires QSs in their future projects to gain maximum value for money, effort and resources.

3. RESEARCH METHODOLOGY

A mix research approach was adopted which is a combination of both qualitative and quantitative approaches used together to eliminate drawbacks of both. Due to the unavailability of client's quantity surveying practices in the power sector in Sri Lanka, a preliminary survey was carried out to collect qualitative data and a questionnaire survey was carried out to collect quantitative data.

Preliminary survey was carried out using an online questionnaire among six QSs working abroad, where QSs are attached to power sector as client's professional. Survey findings ascertained the responsibilities of client's QSs in the power sector, and the skills and competencies require by them. Code-based content analysis technique with NVivo software was adopted to analyze the findings of preliminary survey. Collected information were used for developing the questionnaire.

In the questionnaire survey, the respondents had to rate relevancy of identified responsibilities of the QSs within their own role and frequency of partaking in them. Forty-three (43) responses from professionals involved in the Sri Lankan power sector were collected through questionnaire survey and were analyzed by calculating the relative importance index for the relevancy and frequency of responsibilities, and were ranked accordingly.

4. RESEARCH FINDINGS

4.1. RESPONDENT'S PROFILE

The preliminary survey identified 33 number of responsibilities of a client's QS in the power sector. Figures 1 and 2 show the content distribution of 43 respondents involved in the questionnaire survey according to the type of the organisation and working experience.

Among 43 respondents, a majority of respondents represents Ceylon Electricity Board (CEB) amount to 58% of the sample, followed by respondents representing Lanka Electricity Company Private Limited (LECO) and other power sector organisations amount to 28% and 14% respectively. This clearly shows that more than half of the respondents are from CEB which represents the monopoly of power sector in Sri Lanka while less than half of the sample consists of both LECO and other organisations.

As presented in Figure 2, 46% of the respondents have working experience between 21 to 25 years, 19% of the respondents have 16 to 20 years of experience, 5% of the respondents have 11 to 15 years of experience, 23% of the respondents have 5 to 10 years of experience and 7% have less than 5 years of experience. Since 70% of the respondents, who represents nearly three forth of the respondents, are experienced more than 10 years that help to establish the validity and relevancy of research outcome.

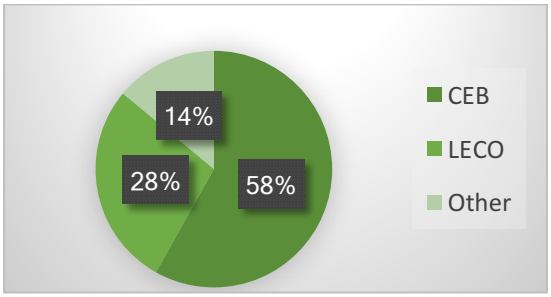

Figure 1: Respondents' Type of Organization

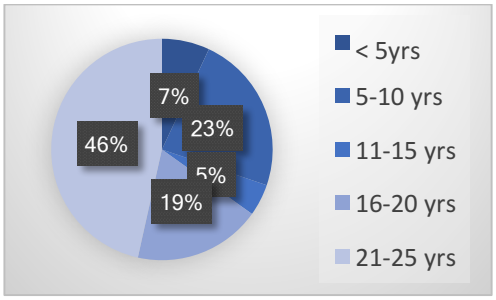

Figure 2: Respondents' Working Experience

Since most of the quantity surveying responsibilities are performed by professionals currently working in the power sector, it was required to consider their area of specialisation to identify whether they are competent enough to perform these responsibilities. However, questionnaire survey findings revealed that none of the professionals are specialised in quantity surveying discipline as depicted in Figure 3. Further it demonstrates that 91% of the respondents were from Electrical Engineering discipline and the balance 9% is from Civil Engineering discipline.

Figure 3: Composition of Area of Specialisation of Respondents

As shown in Figure 4, the designation of the majority of the respondents are Electrical Engineers.

Out of 43 respondents, 16 were Electrical Engineers and 13 were Chief Engineers. Among the others were Electrical Superintendents (02), Civil Engineers (04), Deputy General Managers (05) and one Engineering Assistant.

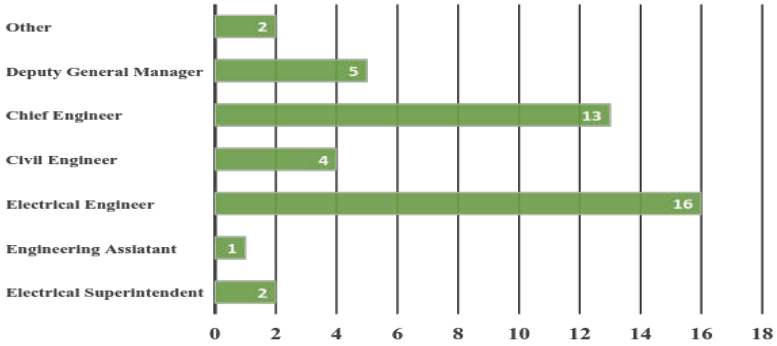

Figure 4: Composition of Respondents' Designation

Ultimately, it's evident from the above depictions that each cluster of the different profile holds a significant proportion to ensure the reliability of information obtained through this survey. Since it's a questionnaire survey to establish the requirement of QSs in power sector majority of the inputs have been collected from experienced respondents in the field of power generation and distribution.

4.2. PRE-CONSTRUCTION DUTIES

Table 1 shows the ranking of those pre-construction responsibilities by power sector professionals according to the relevancy of responsibilities within respondents' own role and frequency of involving in them.

Table 1: Ranking of Pre-Construction Responsibilities According to Relevancy and Frequency

No.	Responsibility	Relevancy Level			Frequency Level		
		MR	RII	Rank*	MR	RII	Rank*
1.	Preparation of Tender and Contract documents	4.12	0.824	2	3.54	0.708	3
15.	Tender evaluation	4.02	0.805	3	3.46	0.692	4
2.	Selection of contractors and subcontractors	3.90	0.781	4	3.22	0.643	5
29.	Ensure the budget is always secure with the design	3.74	0.748	6	3.14	0.627	6
9.	Effective contract negotiation	3.52	0.705	10	2.92	0.584	13
4.	Preparation of cost estimates	3.45	0.690	12	3.03	0.605	9
28.	Feasibility studies	3.36	0.671	15	2.81	0.562	16
5.	Handling cost data and cost advising	3.31	0.662	16	2.65	0.530	20
8.	Budgeting and cash flow forecasting	3.31	0.662	17	3.03	0.605	11
3.	Preparation of pre tender estimates	3.17	0.633	18	2.68	0.535	19
10.	Capturing and valuing cost associated with requirements (Preparation of Rates)	2.98	0.595	24	2.24	0.449	32
12.	Contingency and risk margin allocation	2.98	0.595	25	2.38	0.476	29
14.	Prediction of market trends and their impacts on proposed project	2.67	0.533	30	2.22	0.443	33
31.	Secure the expected profit margin	2.64	0.529	31	2.32	0.465	30

Note: MR – Mean Rating; RII – Relative Importance Index

**Please note that 1 is a lower rank and 2 is an upper rank comparatively.*

According to the ranking of pre-construction responsibilities, they are scattered from first ranks to final ranks in both relevancy and frequency distributions, though, nearly similar ranks are obtained by responsibilities for both relevancy and frequency. Preparation of Tender and Contract documents (1), Tender evaluation (15), Selection of contractors and subcontractors (2) and Ensure the budget is always secure with the design (29) are the responsibilities which are more relevant with power sector professionals' job role and carried out more frequently. Among them, Preparation of Tender and Contract documents (1) and Tender evaluation (15) were rated as highly relevant and most frequently carried out. Therefore, those responsibilities can be assumed as core duties in pre-construction stage of a Clients' QS, if QSs participate in power sector as a client's professional.

Capturing and valuing cost associated with requirements (10), Contingency and risk margin allocation (12), Prediction of market trends and their impacts on proposed project (14) and Secure the expected profit margin (31) are scattered in lower division of relevancy and frequency. Thus, Prediction of market trends and their impacts on proposed project (14) and Secure the expected profit margin (31) shows lowest relevancy and frequency.

Responsibilities budgeting and cash flow forecasting and securing the expected profit margin have got comparatively lower ranks for frequency with upper for relevancy, due to participation in those responsibilities frequently, even they are not very relevant in their job role. Thus, those can be considered more important duties for a Client's QS when they are attached to the Sri Lankan power sector.

4.3. CONSTRUCTION DUTIES

Table 2 illustrates the ranking of those construction responsibilities of power sector professionals according to the relevancy of responsibilities within respondents' own role and frequency of involving in them.

Table 2: Ranking of Construction Responsibilities According to Relevancy and Frequency

No.	Responsibility	Relevancy Level			Frequency Level		
		MR	RII	Rank	MR	RII	Rank
33.	Progress reviewing and updating/ Participation for progress meetings	4.14	0.829	1	3.78	0.757	1
22.	Record keeping of works	3.76	0.752	5	3.73	0.746	2
13.	Contract administration	3.71	0.743	7	3.08	0.616	8
6.	Scope change and variation management of works	3.57	0.714	9	2.78	0.557	17
17.	Interim valuation and payments	3.50	0.700	11	3.11	0.622	7
26.	Conflict management, negotiations and dispute resolution	3.45	0.690	13	2.89	0.578	15
32.	Control the changes arising to initial design by incorporating change control procedures	3.10	0.619	20	2.59	0.519	23
27.	Arbitration/ dispute resolution	3.10	0.619	21	2.51	0.503	26
16.	Cost accounting and control	3.05	0.610	22	2.65	0.530	21
7.	Cash flow monitoring and reporting	2.98	0.595	23	2.59	0.519	24
20.	Handling insurance and bonding	2.86	0.571	26	2.43	0.486	28
11.	Reconciling cost estimates with onsite cost realities	2.86	0.571	27	2.57	0.514	25
30.	Advice the design team time to time by doing cost plans where the cost limit or cost targets are exceeding than as planned	2.86	0.571	28	2.62	0.524	22
19.	Subcontract management	2.45	0.490	33	2.70	0.541	18

Note: MR – Mean Rating; RII – Relative Importance Index

[*]*Please note that 1 is a lower rank and 2 is an upper rank comparatively.*

Construction responsibilities show a similar behaviour as pre-construction responsibilities by distributing within upper ranks to lower ranks. Progress reviewing and updating/ Participation for progress meetings (33), Record keeping of works (22), Contract administration (13) and Interim valuation and payments (17) are the construction responsibilities higher rating in both relevancy and frequency. Therefore, these can be assumed as core responsibilities of a Client's QS in power sector. Progress reviewing and updating/ Participation for progress meetings (33) and Record keeping of works (22) are highly relevant and carried out more frequently by power sector professionals.

Further, Cash flow monitoring and reporting (7), Handling insurance and bonding (20), Reconciling cost estimates with onsite cost realities (11), Advice the design team time to time by doing cost plans where the cost limit or cost targets are exceeding than as planned (30) and Subcontract management (19) are the responsibilities with lower relevancy and frequency. But, they are also scattered near the margin of three of Mean Rating. Though they show lower relevancy and frequency, they are somewhat relevant and somewhat frequently carried out by power sector client's professionals.

Record keeping of works, interim valuations and payments, cost accounting and controlling, reconciling cost estimates with onsite cost realities, advising the design team time to time by doing cost plans where the cost limit or cost targets are exceeding than as planned and subcontract management duties are done more frequently, though, they are not much relevant to the responsibilities of power sector professionals.

4.4. POST CONSTRUCTION DUTIES

Table 3 shows the ranking of those post-construction responsibilities by power sector professionals according to the relevancy of responsibilities within respondents' own role and frequency of involving in them.

Table 3: Ranking of Post Construction Responsibilities According to Relevancy and Frequency

No.	Responsibility	Relevancy Level			Frequency Level		
		MR	RII	Rank	MR	RII	Rank
23.	Management of defects rectification liability	3.69	0.738	8	3.00	0.600	12
25.	Obtaining practical/ final completions and Code Compliance Certificates	3.43	0.686	14	3.03	0.605	10
24.	Agreeing final accounts	3.14	0.629	19	2.92	0.584	14
21.	Handling liquidated and ascertained damages	2.79	0.557	29	2.49	0.497	27
18.	Cost analysis/ Cost modelling	2.55	0.510	32	2.30	0.459	31

Note: MR – Mean Rating; RII – Relative Importance Index

Please note that 1 is a lower rank and 2 is an upper rank comparatively.

Identified post construction responsibilities are less in number, thus, most of them are distributed in middle ranking of both relevancy and frequency rankings which is three of Mean Rating. Obtaining practical/ final completions and Code Compliance Certificates (25) shows more relevancy and frequency, the code compliance can be considered as a necessary requirement in the power sector. Handling liquidated and ascertained damages (21) and Cost analysis/ Cost modelling (18) shows less relevancy and also less frequency.

Responsibilities obtaining practical/ final completions and Code Compliance Certificates, agreeing final accounts, handling liquidated and ascertained damages and cost analysis/ cost modelling show lower ranking in frequency than relevancy which can be considered as supportive responsibilities to the core functions of a Client's QS within power sector.

4.5. COMPARISON OF RELEVANCY VS. FREQUENCY OF RESPONSIBILITIES

Figure 5 demonstrates the distribution of responsibilities considering their mean rating for relevancy and frequency. Responsibilities are numbered according to the numbering given in above tables. It can be observed that there are no responsibilities with low relevancy but high frequency.

Most of the responsibilities (13 out of 33) are distributed within higher relevancy and higher frequency area. 11 responsibilities are in higher relevancy lower frequency area, which are to be considered as the responsibilities that should be included in Client's QS's job role such as Feasibility studies (28) inclusive of life cycle costing. There are 9 responsibilities in lower relevancy lower frequency area, i.e. Prediction of market trends and their impacts on proposed project (14) and Secure the expected profit margin (31) shows lowest relevancy and frequency which may have led to cost and time overruns as identified in the research problem. However, this matrix plot will be useful in defining Client's QS's role within the power sector.

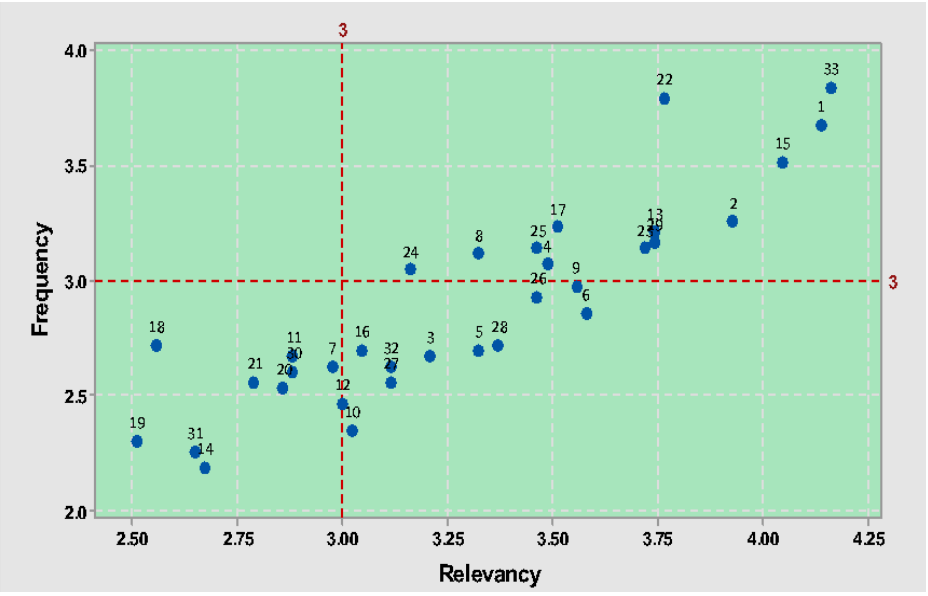

Figure 5: Matrix Plot of Relevancy vs. Frequency

5. CONCLUSIONS

This study has enclosed QSs having his/her professional practice in power sector. Analysis on research findings acknowledged the importance of QSs to involve in Sri Lankan power sector. Since the information revealed through literature is lacking to achieve the research objectives, a preliminary survey was conducted among QSs who are working in the power sector abroad. Accordingly, research findings from the questionnaire survey provided objective evidence for the data identified through the literature and collected through preliminary survey. This created a triangular effect between literature findings together with preliminary survey and questionnaire survey to make the data more reliable and valid.

Subsequently the profession of Quantity Surveying has widespread to many sectors with their expertise knowledge on cost management, Sri Lankan power sector operating within the government monopoly, is identified as a potential segment of new entrance for QSs. Questionnaire survey conducted identified the relevance of QSs in the power sector. Most of the duties performed by QS are conducted frequently by power sector professionals such as Electrical Engineers though their area of specification is not related to QS practices. In respondent profiles' there were no QSs involved but a few number of Civil Engineers. Their area of specialization also restricted to Electrical Engineering, where it can be concluded that if a QS expects to practice in power sector he would require to gain specific knowledge on Electrical Engineering, at least the basic concepts.

Moreover, from research findings it can be identified that the potential responsibilities of a Client's QS in power sector to be attached to his job role are the responsibilities that got lower ranking in frequency, but upper rank in relevancy as they are the responsibilities that are important for power sector clients but not relevant to current professionals. Eventually, it can be concluded that the profession of Quantity Surveying is important in Sri Lankan power sector within client practices.

There are several barriers for QSs to enter into power sector, such as being a specified field there are deviations of characteristics of construction methods, materials, and equipment from the construction industry causing QSs to acquire technical knowledge. Therefore, it is recommended to adhere electrical specific knowledge to the syllabuses of higher education institutes generating professional QSs.

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