



# FOCUS

Quarterly E-Magazine of  
The Institute of Quantity Surveyors, Sri Lanka  
Volume 13: Issue 01, August 2021

## **Annual Forum Theme for 2021**

Emerging Challenges  
and Roles for  
Professionals in  
Circular Built  
Environment

## **Magazine Highlights**

AGM, Forum and Technical Sessions 2021

IQSSL Board Reports 2020/2021

Compressing Construction Periods through  
Collaborative Approaches

Readiness of 5D BIM Implementation

New Associate Members

Board and Subcommittee Members  
for 2020/2021

Published by:

Institute of Quantity Surveyors Sri Lanka (IQSSL)



### Editorial Board

Ch.QS. Prof. (Mrs.) Kanchana Perera  
Prof. (Mrs.) Udayangani Kulatunga  
Mr. Dharshaan Vijayananda  
Dr. (Mrs.) Menaha Thayaparan  
Dr. (Mrs.) Tharusha Ranadewa

### Board of Quantity Surveying Publication

Ch.QS. Duleesha Wijesiri (Chairman)  
Ch.QS. Mahinda Gunawardena  
Ch. QS Majith Kodithuwakku  
Ch.QS. (Ms.) Dhamisha Sriyananda  
Ch.QS. Buddhika Perera  
Ch.QS. Prasad Dissanayake  
Ch. QS (Ms) Iresha Perera

### Disclaimer

The information contained in this publication should not form the basis of any decision as to a particular course of action; nor should it be relied upon as a professional advice. Under no circumstances shall the publisher be liable for any direct, incidental, special and consequential loss and damage that results from the readers' reliance or non-reliance of information provided in this publication. The copyright of this publication vests solely and exclusively with the publisher and no part may be reproduced or transmitted by any process or means without prior written permission of the Institute of Quantity Surveyors, Sri Lanka.



## Annual General Meeting (AGM) and Annual Forum 2021

The Annual General Meeting and the Annual Forum of the Institute of Quantity Surveyors Sri Lanka for the year 2021 will be held on 27<sup>th</sup> August 2021 and 28<sup>th</sup> August 2021 respectively. Adhering to the health guidelines which are of paramount importance in the current pandemic situation, for the first time in its history, the IQSSL will be conducting the AGM and the Annual Forum on a virtual platform via the Zoom software.

The proceedings of the AGM will commence at 2:00 PM on the 27<sup>th</sup> August 2021 with the attendance of Corporate Members of IQSSL of good standing and the current President Ch. QS Lalith Ratnayake is expected to conclude his highly successful two year tenure at the helm.

The theme for this year's Annual Forum has been selected as "Emerging Challenges and Roles for Professionals in Circular Built Environment" in line with the ever increasing necessity to focus on nature and sustainability, while continuing the developments in the built environment. Prof. Andrew Ross, Professor of Construction Project Management at Liverpool John Moores University (UK) is expected to grace the Annual Forum as the Keynote Speaker. In addition, six learned speakers representing six countries are expected to share their expertise on the subject.

## Annual Technical Sessions 2021

Continuing the tradition amidst the challenging pandemic situation, IQSSL will hold its Annual Technical Sessions 2021 on the 26<sup>th</sup> August 2021 via Zoom online platform. The Annual Technical Sessions 2021 will be a historical event as, for the first time, IQSSL is collaborating with Singapore Institute of Surveyors and Valuers in organising the event as an international fixture.

Inline with the IQSSL's Annual Forum, the theme for the Annual Technical Sessions 2021 has been selected as "Emerging Challenges and Roles for the Quantity Surveyors in Circular Built Environment." Several local and international guest speakers will grace the event to disseminate their knowledge. An audience of 500 local and international participants are expected to attend the event.



# Governing Council of Institute of Quantity Surveyors Sri Lanka - 2020/2021



## Seated (Left to Right)

Ch.QS (Mrs.) Dilani Abeynayake (Council Member), Ch.QS Indunil Seneviratne (Treasurer), Ch.QS Upul Shantha (Immediate Past President), Ch.QS Lalith Ratnayake (President), Ch.QS Prof. (Mrs.) Kanchana Perera (Vice President), Ch.QS Senerath Wetthasinghe (Secretary), Ch.QS (Mrs.) Yasitha Bulathsinghala (Council Member)

## Standing (Left to Right)

Ch.QS Nandun Fernando (Council Member), Ch.QS Sumith Lokuge (Council Member), Ch.QS Tilanka Wijesinghe (Assistant Secretary), Ch.QS Duleesha Wijesiri (Council Member), Ch.QS Hasitha Gunasekara (Council Member), Ch.QS Jayantha Jayakody (Council Member), Ch.QS Prasad Jasinghe (Council Member), Ch.QS Jagath Basnayake (Council Member), Ch.QS Mahinda Gunawardana (Council Member), Ch.QS Rajitha Dasanayake (Council Member)

**THE ANNUAL FORUM 2021**

**Emerging Challenges and Roles for Professionals in Circular Built Environment**

**INSTITUTE OF QUANTITY SURVEYORS SRI LANKA**

28th August 2021 From 3.00pm to 5.30 pm (GMT+5.30) via Zoom



# Emerging Challenges in the Circular Built Environment and Rethinking the Role of Professionals

Dr. Roshani Palliyaguru

## 1. Background

Circular economy (CE) is considered an operationalizable and attainable concept within the much-theoretical and broader philosophy of "Sustainable Development" (Murray et al., 2017). It has been gaining the attention of many national governments, including China, Japan, the UK, France, Canada, the Netherlands, Sweden, and Finland (Korhonen et al., 2018) and, accordingly, CE has been recognized and adopted as a key approach to sustainable urban development by business and political programmes in China (China Circular Economy, n.d; Joensuu et al., 2020) as well as in the European Union (Joensuu et al., 2020; European Commission n.d).

Conventional construction practices have been a significant concern in the construction industries of both developed and developing countries. Having recognized the emergence and evolution of the CE concept in other sectors and its potential implications for the built environment in achieving a resource-effective built environment (van Stijn and Gruis, 2020) and ultimately the desired sustainability, built-environment professionals in the developed world have started to become more and more conscious about embracing it in their professional roles. Nevertheless, adoption is challenging and must be given due prominence, both in developed and developing countries.

This article reviews the existing knowledge on this subject to provide comprehensive insights into the application of the concept of CE to the built environment, the critical challenges encountered during its application, and the role of built-environment professionals in the circular built environment.

## 2. Circular Economy vs. Sustainable Development

CE has been interpreted differently by different people from different parts of the world (Kirchherr et al., 2017). The CE is recognized as an approach to economic growth while being in line with sustainable development (Korhonen et al., 2018; Kirchherr et al., 2017). Accordingly, it is commonplace to consider the concept of CE from the perspective of sustainable development (Korhonen et al., 2018), whereas the similarities and differences between the two are still blurry (Geissdoerfer et al., 2017; Kirchherr et al., 2017). Sustainable development was originally defined as "*development that meets the needs of the present without compromising the ability of future generations to meet their own needs*" (WCED, 1987), which is considered a linear throughput flow of materials and energy between natural and human environments in the sequence of extract-produce-use-dump and thus ultimately be unsustainable (Korhonen et al., 2018).



Conversely, the CE provides the economic system with an alternative material and energy flow model which is cyclical and more resource-efficient by liberating economic growth from resource consumption (van Stijn and Gruis, 2020). Research by the Ellen MacArthur Foundation (2015), van Stijn and Gruis (2020), and Mendoza et al. (2017) have recapitulated the CE concept into three principles:

- i. Fostering system effectiveness by revealing and designing out negative externalities;
- ii. Optimizing the use of resources by reusing and recycling them;
- iii. Saving and enhancing the natural resource pool by controlling finite stock and adopting more renewable resources.



Figure 01: Three Principles of Circular Economy

Nevertheless, the core principles of CE can be mainly distinguished into two types, as "R frameworks" and the "systems perspective" (Kirchherr et al., 2017). The R-frameworks currently in use vary from the 3Rs, 4Rs, and 6Rs to the 9Rs frameworks as detailed in Figure 02 below. The system perspective claims that the transition to CE needs to occur at three levels (Kirchherr et al., 2017):

- **Macro-systems** which highlight the need to adjust industrial composition and structure of the entire economy;
- **Meso-systems** which usually focuses on eco-industrial parks as systems and this level is also called the 'regional level';

- **Micro-systems** which usually considers products, individual enterprises and what needs to happen to increase their circularity as well as consumers.

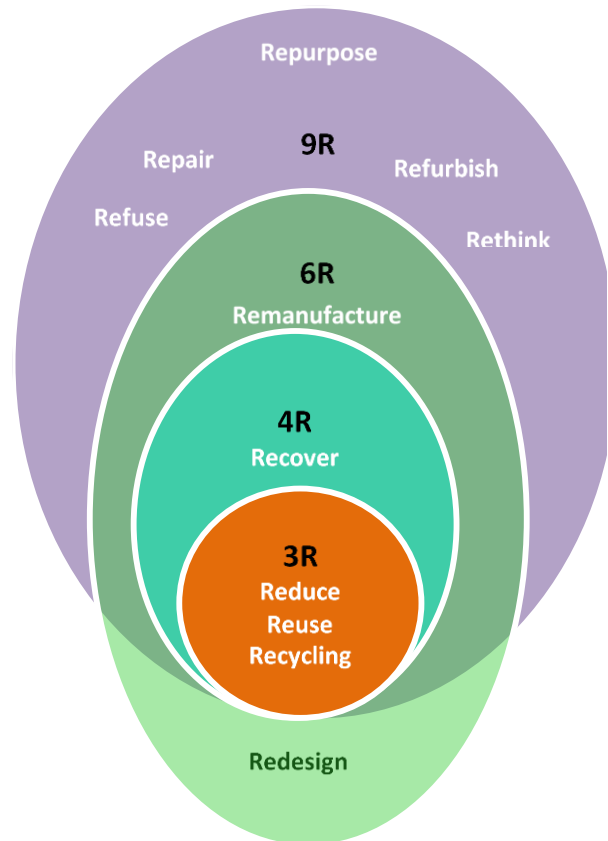


Figure 02: "R" frameworks of Circular Economy

### 3. Principles of Circular Built Environment and Strategies for Implementation

The built environment refers to everything that reflects man's intervention in the natural environment that results in human settlements, buildings, and infrastructure such as transport, energy, water supply, and drainage. The construction industry, being the core and foremost industry responsible for the creation of the built environment, is usually recognized as one of the main sources of environmental pollution in the world.



It is usually criticized for its massive direct and indirect effects on the natural environment. For instance, Joensuu et al. (2020) report that the majority of global greenhouse gas emissions and raw material exploitation are caused by the built environment, where both the construction and operation phases of built environment structures consume a plethora of resources and energy. The available statistics show that the construction industry is responsible for over 30% of the extraction of natural resources in the world and 25% of the solid waste generation (Benachio et al., 2020).

Sri Lanka is currently experiencing a significant boom in the construction industry since the beginning of the last decade. This growth itself has placed the industry in the dilemma of making construction projects more profitable, but at the same time complying with sustainable construction practices. While the need for sustainable construction has been more positively taken up and is constantly being encouraged by organisations such as the Central Environmental Authority of Sri Lanka, Sri Lanka Sustainable Energy Authority and the Green Building Council of Sri Lanka (GBCSL), Sri Lanka, as a nation with a developing industry, has a lot to do to be on par with the much broader sustainability standards and practices adopted in developed countries. Integration of environmental considerations into the development process of the country is currently governed by the 'National Environmental Act No. 47 of 1980' and its subsequent amendments, along with environmental protection regulations such as 'National Environmental (Protection and Quality) Regulations - No. 1 of 2008' and environmental impact assessment regulations such as 'National Environmental (Procedure for approval of projects) Regulations No. 1 of 1993'.

Yet, the existing methods of sustainability are frequently considered incompatible with sound business practices. Therefore, it is worth investigating alternative measures for the built environment to address its sustainability issues while also meeting commercial objectives. In a context where CE is claimed to be one of the solutions to the global sustainability problem (Joensuu et al., 2020) and has gained wider traction both among practitioners and scholars in the built environment, an opportunity has arisen for the Sri Lankan construction industry to seriously embrace a CE approach in their construction projects.

The Royal Institution of Chartered Surveyors (2019) too refers to the application of the CE concept in the built environment under the same three principles as referred above in Figure 01. Benachio et al. (2020) refer to the application of the CE concept in the construction industry as "*the use of practices in all stages of the life cycle of a building, to keep the materials as long as possible in a closed-loop, to reduce the use of new natural resources in a construction project*". The construction industry generally uses materials and energy in a linear process, i.e. extracting-making-using-disposing, resulting in increased difficulties in terms of scarcity of natural resources, pollution, carbon emissions, and waste generation. With the adoption of the CE concept in the construction industry, it is expected to be heading towards a paradigm shift focusing on keeping resources in a closed loop to retain their maximum value and thus prevent the use of resources and waste generated as outputs, not only by recycling and reusing, but primarily by reducing the need for resources (Benachio et al., 2020; Joensuu et al., 2020) (See Figure 03).

It is apparent that a considerable knowledge base already exists on the various strategies for the circular built environment, but mainly focusing on one particular life cycle stage of construction projects or production methods (e.g. prefabrication), or a specific resource flow such as material flow only. Hence, a holistic approach to the application of the CE principles to the built environment is essential, as the one proposed by Çetin et al (2021), which is summarised in Table 01, in which the CE principles have been categorised as Regenerate, Narrow, Slow, Close, and Collaborate, with clear meanings assigned to each as described below:

- **Regenerate:** Refers to regenerating continuous flows of resources in a self-sufficient manner in which co-evolutionary systems are initiated between humans and nature to create a net positive impact on the environment.
- **Narrow:** Refers to the use of fewer resources throughout a building’s lifetime and improving resource efficiency.
- **Slow:** Refers to slowing down resource loops, which intends to slow down the speed of resource flows by intensifying their use and extending their valuable service life through design and operational strategies.
- **Close:** Refers to closing resource loops which aim to bring resources back into the economic cycle when buildings reach their end-of-use stage.
- **Collaborate (as a supporting strategy):** A higher degree of collaboration among supply chain actors is encouraged due to the highly fragmented and inefficient nature of the construction industry.

Table 01: Summary of circular building strategies and examples  
(Source: Çetin et al., 2021)

CE Principles	Circular Building Strategies	Examples
Regenerate	Stimulate human nature co-habitation and local biodiversity	Create spaces for human-nature interaction and biodiversity, e.g., green roofs.
	Use healthy and renewable resources	Eliminate toxic contents, use bio-based materials, and produce with renewable energy, e.g., producing insulation panels from mycelium.
	Enhance indoor and outdoor environment	Improve the indoor environment and regenerate degraded outdoor spaces, e.g., transformation of misused urban areas into public spaces.
	Exchange excess resources	Exchange surplus resources produced by regenerative buildings, e.g., exchanging renewable energy within the neighborhood.
Narrow	Reduce primary resource inputs	Minimize primary resource use and waste, e.g., optimization of lightweight structures
	Design for high performance	Optimize buildings and systems for less resource use, e.g., early design optimization for passive performance.
	Improve efficiency	Enhance performance of building systems and operations to minimize resource consumption, e.g., deep energy renovation of old houses.





Slow	Design for long life	Design buildings with durable materials, consider ease of maintenance and repair, and design for emotional attachment.
	Design for reversibility	Design buildings and products for multiple life cycles with deconstruction and transformation strategies.
	Lifetime extension	Extend the service time of buildings and components through restorative activities such as repair, maintenance, and refurbishment.
	Smart use of space	Deliver new functionalities to underutilized buildings, and land through adaptive reuse and flexibility, e.g., flexible office spaces.
	Deliver access and performance	Provide access, functionality or services without offering ownership of buildings and building products, e.g., pay-per-lux model for lighting.
	Reuse	Bring resources back into the economy with a minimum of resource input, e.g., construct indoor partitions from old windows during façade renovation.
Close	Recycle	Convert reclaimed resources into similar or lower quality ones with considerable energy and water input, e.g., recycling concrete aggregates.
	Urban mining	Extract materials from the urban environment that are not designed for reuse or recycling.
	Industrial symbiosis	Initiate synergistic interactions between different industries to recover waste and by-products, e.g., an industrial symbiosis for recycled aggregates
	Track and trace resources	Track and trace resources from extraction/reclamation until end-of-use stages and in further cycles.
Collaborate (supporting strategy)	Support supply chain collaboration	Work with partners in the existing supply chain to slow, close, narrow and regenerate resource loops, e.g., for reverse logistics.
	Create knowledge and value networks	Identify and develop new networks for collaboration to implement ambitious CE visions, e.g., a buyer group to foster circular procurement.

In summary, the main idea of CE is to prevent the generation of waste outputs, retain the value of resources, and prevent the use of virgin materials, not only by recycling and reusing, but primarily by reducing the need for resources (Joensuu et al., 2020).

Thus, transcending traditional recycling, *"a practical policy and business-orientated CE approach emphasizes product, component, and material reuse, remanufacturing, refurbishment, repair, cascading and upgrading, as well as solar, wind, biomass, and waste-derived energy utilization throughout the product value chain and cradle-to-cradle life cycle"* (Korhonen et al., 2018), as depicted in Figure 03.

#### LINEAR APPROACH



## CIRCULAR APPROACH

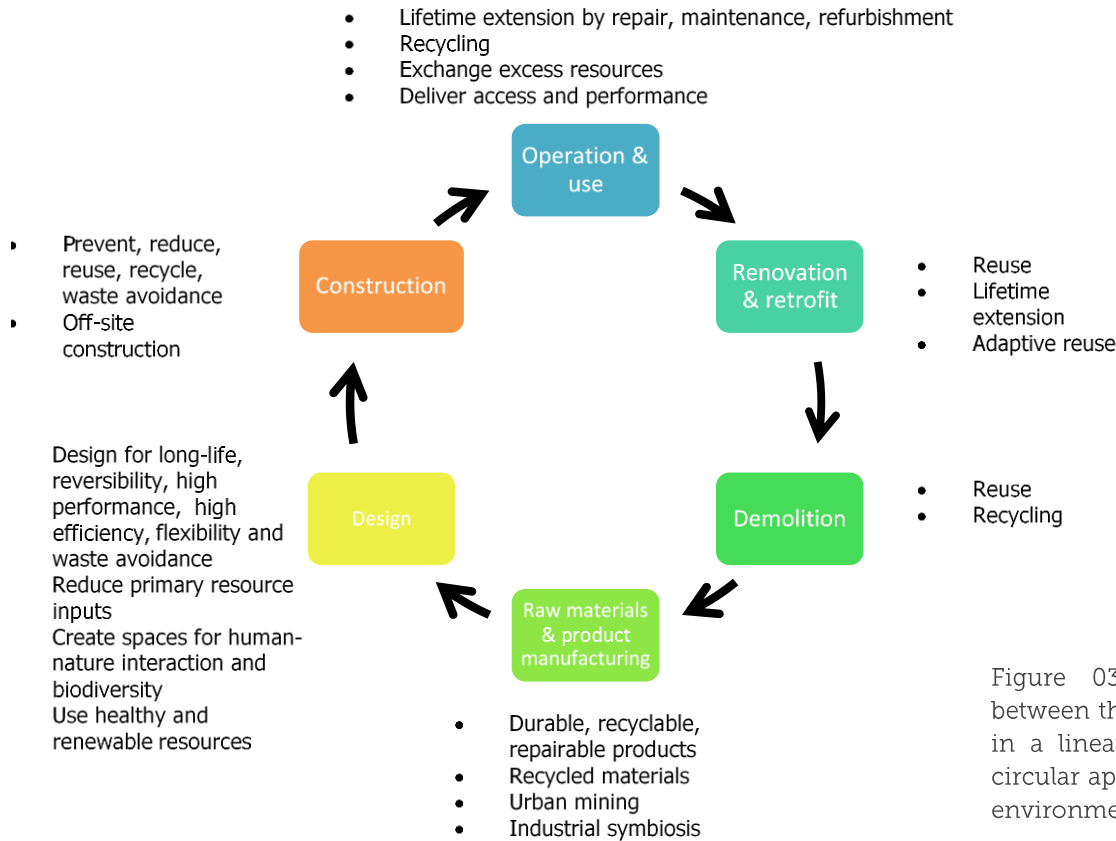


Figure 03: A comparison between the use of resources in a linear approach and a circular approach in the built environment

Accordingly, in addition to its ability to reduce negative environmental impacts, the concept of CE has the potential to create new business opportunities (Korhonen et al., 2018), which is equally applicable to the built environment as well, considering the huge supply-chain involved in the construction industry. More importantly, it can provide timely answers to ever growing problems in the construction industry, namely, the price inflation of raw materials, maintaining essential natural ecosystem services, and creating urban areas that are more livable, productive, and convenient (RICS, 2019). The effective application of CE principles can increase the productivity of the global construction industry while saving billions of dollars and boosting economic growth.

## 4. Challenges Encountered in the Journey towards a Circular Built Environment

The empirical research conducted by Arup in collaboration with the RICS among 105 interviewees involved in the value chain of the construction industry in several cities in Europe and across 116 case studies, revealed the lack of knowledge among the construction industry stakeholders about the practical implementation of CE principles as a major challenge, although they are aware of the benefits of the concept (RICS, 2019). Also, the attitudinal and cultural barriers which restrict professionals from taking risks and make them more risk averse lead to a lack of interest in or willingness to adopt the CE concept (Gupta, 2019) during the project planning and design stages.



The fragmented nature of the industry, thus the lack of collaboration among the stakeholders (RICS, 2019), which leads to the sharing of responsibilities not being clear and the necessary information not being exchanged between professionals about the application of CE principles (Gupta, 2019), also adds to the list of challenges.

Misalignment between business planning cycles and built environment asset life-cycles (RICS, 2019) and wrong business models being adopted by investors/developers are also major barriers because there is a critical need to view CE as a business strategy rather than a simple piece of technology. Limited funding for CE models; high upfront investment costs; low virgin material prices; lack of information and techniques to assess economic viability, financial profitability, impact etc. of circular business models (e.g. shortcomings of life-cycle assessment techniques in the ability to reveal benefits of CE practices); limited large-scale demonstration projects; and the absence of standardization are also further hindrances (Gupta, 2019).

The lack of leadership and pioneers at global, national, local and project levels and a clear consensus to adopt the CE principles to the built environment are also major barriers, especially concerning a developing country like Sri Lanka (Gupta, 2019). The lack of appropriate decision-making authority, capabilities, and skills is hampering the potential to incorporate CE principles into the planning and design stages of construction projects, which are the two most influential phases of a construction project.

While Europe is leading the way towards a CE, other regions, including Asia, are still in the process of understanding what circularity

actually means for their built environment, whereas some of them are already proactively engaged in drafting policies and programmes with the goal of transitioning to a low-carbon future (Iyer-Raniga and Huovila, 2020). Yet, to a larger extent, Asia is still leaning towards a linear model for fulfilling the built environment needs of its communities, which is a vital concern that needs adequate attention from the respective governments in shifting to a circular model. Deficiencies in the enforcement of existing laws and regulations that could otherwise lead to proper management of waste while limiting waste generation, emissions, and resource extraction restrict the adaptability of CE principles in Sri Lanka. And the process is further hindered by the potential delays in introducing new laws and regulations with stringent public policy for strict enforcement of CE principles in the built environment (e.g. recycling requirements for certain construction materials/components).

## **5. Role of Built Environment Professionals in the Circular Built Environment**

Built environment professionals include practitioners who are primarily concerned with designing, engineering, procurement, construction, surveying, management, and planning aspects related to the construction and operations and maintenance of built environment structures. The built environment sector has a critical role to play in the shift from a linear to a circular economy that is more sustainable, thus the built-environment professionals.

First and foremost, circularity must be made mainstream in the built environment, and for that, built-environment professionals need to think and act differently and be prepared to



embrace a paradigm shift toward a circular built environment. It is a time-taking exercise, but it is much more viable at present, where governments are seriously considering new economic approaches to catalyze economic recovery in response to the world-wide economic downturn resultant from the Covid-19 pandemic (Iyer-Raniga and Huovila, 2020). This requires further formal education and skill development across all professions within the built environment, to bridge the gap between the existing competencies and industry needs. These professionals would include, but are not limited to:

- Architects
- Urban Designers
- Planners
- Civil/Structural/Services/Environmental Engineers
- Quantity Surveyors
- Land Surveyors
- Building Surveyors
- Project Managers
- Facility Managers

It is believed that the built environment can be made more circular by applying circular building components (van Stijn and Gruis, 2020), better waste management strategies, design strategies, and other strategies. Nevertheless, it is important that the construction industry overcome the common misconception that CE is just a waste management or a design strategy. Instead, professionals should be educated and trained to view CE as a business strategy. It is against this backdrop that built environment stakeholders such as public-sector policymakers – at all levels of government, investors (private investors, institutional investors, public-sector investment, banks

and other lenders) and construction clients (commercial and residential developers, infrastructure and building owner-operators) are recognized as having a significant role in initiating the implementation. By viewing CE as a business strategy by investors and clients, and changing business models accordingly, the entire industry can be incentivized and made commercially more attractive.

The lack of information and techniques to assess the economic viability, financial profitability, and the impact of CE, is an area where the competencies of Quantity Surveyors can be of great help in addressing them through their knowledge of techniques such as value management, life-cycle assessment, embodied carbon analysis, cost-benefit analysis, energy calculations, economic analysis, etc. Legislators and policy makers also need to be provided with sufficient data and information about economic viability, financial profitability, and the impact of the application of CE principles on commercial-level projects, so that more effective and worthwhile regulations and policies can be formulated.

Although the adoption of strategies to promote circularity principles throughout the lifecycle of buildings is a primary responsibility of all built environment professionals, the professionals involved in the planning and design phases of built environment projects have a more vital role in embedding lifecycle considerations at the very outset itself, considering operation and maintenance, deconstruction, and post-deconstruction of built environment structures. Compared to the rest of the phases of a project, pre-construction is the phase where most of the



crucial decisions are to be taken, as the changes made at later stages are more costly. Hence, aiming for green designs; choosing recyclable, durable, reusable, bio-based building materials; choosing systems that use renewable energy; designing for adaptability and flexibility; designing for standardization and modularity; design optimization for passive performance; and setting targets for allowable wastage, carbon reduction, material recovery etc. are just a few of the circular building strategies listed in Table 01 for which not only architects but also other professionals are accountable in early stages of construction projects.

Procurement specialists should focus on locally-based and environmentally friendly procurement practices in a manner that drives supply-chains less reliant on international chains. Reliance on global supply chains is currently being severely questioned in the context of the Covid-19 pandemic. Boosting local product and service-based associated industries, such as manufacturing of bio-based building materials, and social-entrepreneurs for product recycling, will certainly help a paradigm shift towards a circular built environment. Such new industries/sectors pave the way for cross-industry collaboration for a better circular built environment. New business models that promote circularity can further encourage such cross-industry collaborations. Exemplary public-private partnerships will certainly be beneficial in this regard.

## 6. Helpful Emerging Operational Platforms

Çetin et al. (2021) identify ten enabling digital technologies to facilitate a circular economy in the built environment, namely, additive / robotic manufacturing, artificial intelligence, big data and analytics, blockchain technology, building information modelling, digital platforms/marketplaces, digital twins, the geographical information system, material passports/databanks, and the internet of things. Thus, it is clear that built-environment professionals would be able to employ these digital technologies and contribute to the development of circularity in the built environment, if the technologies could be clearly understood and appreciated.

## 7. References

- Benachio, G.L.K., Freitas, M.C.D. and Tavares, S.F., 2020, Circular economy in the construction industry: A systematic literature review, *Journal of Cleaner Production*, Vol 260, 121046.
- Çetin, S., De Wolf, C. and Bocken, N., 2021, Circular Digital Built Environment: An Emerging Framework, *Sustainability*, Vol. 13(11), 6348.
- Circular Economy Promotion Law of the People's Republic of China, n.d. URL. <http://ppp.worldbank.org/public-private-partnership/library/china-circular-economy-promotion-law> (accessed July 16, 2021).
- European Commission, *Circular economy action plan*. n.d. URL. [https://ec.europa.eu/environment/strategy/circular-economy-action-plan\\_en](https://ec.europa.eu/environment/strategy/circular-economy-action-plan_en) (accessed July 19, 2021).





Ellen MacArthur Foundation, 2015, *Towards a Circular Economy: Business Rationale for an Accelerated Transition*, Ellen MacArthur Foundation. [https://www.ellenmacarthurfoundation.org/assets/downloads/TCE\\_Ellen-MacArthur-Foundation\\_9-Dec-2015.pdf](https://www.ellenmacarthurfoundation.org/assets/downloads/TCE_Ellen-MacArthur-Foundation_9-Dec-2015.pdf) (accessed July 19, 2021).

Geissdoerfer, M., Savaget, P. Bocken, N.M.P. and Hultink, E.J., 2017, The Circular Economy - A new sustainability paradigm, *Journal of Cleaner Production*, Vol 143, pp. 757-768.

Gupta, S., 2019, Barriers and Opportunities in Circular Economy in the Construction Industry in India, *Global Research and Development Journal for Engineering*, Vol 4(7), pp. 19-21.

Iyer-Raniga U. and Huovila, P. 2020, Global state of play for circular built environment, United Nations One Planet Network Sustainable Buildings and Construction Programme.

Joensuu, T., Edelman, H. and Saari, A., 2020, Circular economy practices in the built environment, *Journal of Cleaner Production*, Vol 276 (10), 124215.

Kirchherr, J., Reike, D. and Hekkert, M., 2017, Conceptualizing the circular economy: An analysis of 114 definitions, *Resources, Conservation & Recycling*, Vol. 127, pp. 221-232.

Korhonen, J., Honkasalo, A. and Seppälä, J., 2018, Circular Economy: The Concept and its Limitations, *Ecological Economics*, Vol. 143, pp. 37-46. doi:10.1016/j.ecolecon.2017.06.041.

Mendoza, J. M. F., Sharmina, M., Gallego-Schmid, A., Heyes, G., and Azapagic, A., 2017, Integrating Backcasting and Eco-Design for the Circular Economy: The BECE Framework, *Journal of Industrial Ecology*, Vol 21(3), pp.526-544.

Murray, A., Skene, K. and Haynes, K., 2017, The circular economy: an interdisciplinary exploration of the concept and application in a global context, *Journal of Business Ethics*, Vol 140(3), pp. 369-380. doi:10.1007/s10551-015-2693-2

Royal Institution of Chartered Surveyors, 2019, *A circular built environment: from principles to practices*, <https://www.rics.org/south-asia/wbef/megatrends/natural-environment/a-circular-built-environment-from-principles-to-practices/> (accessed July 21, 2021).

van Stijn, A. and Gruis, V., 2020, Towards a circular built environment: An integral design tool for circular building component, *Smart and Sustainable Built Environment*, Vol. 9(4), pp. 635-653, <https://doi.org/10.1108/SASBE-05-2019-0063>.

World Council on Environment and Development, 1987, Report of the World Commission on Environment and Development: Our Common Future, Oxford University Press, New York.



# Message from the Chief Guest

It gives me a pleasure to send my greetings to the Annual Forum 2021 organised by the Institute of Quantity Surveyors, Sri Lanka (IQSSL) on the theme "Emerging Challenges and Roles of Professionals in Circular Built Environment."

The COVID-19 pandemic has caused a considerable loss of human lives posing an unprecedented challenge to the world. The economic and social disruption caused by the pandemic is significant, especially in developing countries like our motherland. At the time when Government is making enormous efforts to control the pandemic in Sri Lanka, the theme of the forum is very opportune and I strongly believe that it would make an immense contribution to our efforts at recovering from the adverse effects of the pandemic.

In policy making, implementation of them and particularly in sourcing building materials, both scarcity of natural resources and significant component of imports, for construction industry, I observed the significance in pragmatic application of circular built environment principles to minimise waste of natural resources and burden on much scarce foreign currency reserves.

The circular economy helps to improve use of resources efficiently, reduce environmental pollution, and enhance financial, social, and environmental values. People have been abusing nature for a very long period of time and many believe that recurring natural disasters are a result of the same.



Indika Anuruddha Herath (M.P.)

Minister of State Ministry of  
Rural Housing and Construction &  
Building Material Industries Promotion  
Stage 1, "Sethsiripaya"  
Sri Jayawardenepura, Kotte  
Battaramulla  
Sri Lanka

Thus, it is imperative that we start treating nature with the respect it deserves and focus our attention on sustainability with emphasis on circular economy.

The construction industry is one of the highest resource consumers in the world. Sri Lanka is not an exception and if the circular built environment principles and policies can be integrated into the construction industry, I believe it would reduce the amount of waste generated with reduced adverse environmental impacts ensuring the practical achievement of much spoken sustainability of the industry.

I extend my best wishes for the success of the forum and take this opportunity to thank the Governing Council and the Members of IQSSL who contributed to make this Annual Forum a reality amidst the Covid-19 pandemic.

# Message from the Key Note Speaker

The traditional QS role of quantification has been under challenge over the last two decades by the increasing use of Building Information modelling and changing client procurements approaches. Next year will be the 100<sup>th</sup> anniversary of the first publication of the standard method of measurement in the UK, a publication that underpinned a central role of a quantity surveyor. Since this first edition, the QS role has expanded and evolved with technology and changing needs of clients and society.

As we emerge from a global pandemic, which has forced clients, professionals and users of built environment to use technology for alternative ways of working and transacting, it has also forced society to reflect upon how the built environment must change to meet our future requirements. The challenge of climate change is more complex to that of the pandemic and we will need to fundamentally change how we create, use and reuse our built environment. The QS profession should not waste this crisis and new normality to carry on as we were, it can evolve to become a technologically confident profession that is central to the information management of property and construction and one that provides optimum design and construction solutions for a low carbon future that are based upon robust empirical analysis. These future challenges will require the profession to use every reserve of its experience and creativity, and, if the last 100 years has shown, it is a profession that does not duck a challenge.



Prof. Andrew Ross

BSc (Hons), MSc, PhD, MRICS, FHEA  
Professor Emeritus - Construction  
Economics and Management  
Liverpool John Moores University





# Message from the President

It is with great pleasure that I send this message as the outgoing President of IQSSL on the occasions of its AGM, annual forum and technical sessions of the term 2020/2021.

At a time when stakeholders of the construction industry are combatting with the austerity of few waves of the COVID 19 pandemic and economic downturn, IQSSL holds this annual event. The series of unfortunate events that occurred in recent years starting from the Easter Sunday terror attack in 2019, adversely affected the performance of the industry. However, it is noteworthy that the large number of construction sector enterprises have found ways and means at least to have mere survival with these series of impediments. IQSSL is not an exception to these inimical impacts though managed to achieve reasonable progress in last two years. The actual impact of the pandemic on the construction industry as a whole is yet to be estimated as the studies on the subject are still ongoing.

In looking at the way forward amidst this imbroglio of haunting disasters that appears to shape our lives and businesses, IQSSL has chosen a timely theme to deliberate about shaping the built environment for future.



Lalith Ratnayake  
B.Sc. (QS) Hons, M.Sc. PM, F.I.Q.S.SL  
President - IQSSL

The ecological footprint of human population on the planet would have already surpassed its physical limits and it cannot continue to grow. Although the biocapacity of earth is limited, according to literature, the global population, which currently stands at 7.3 billion, will continue to increase; it is expected to reach nearly 10 billion by 2050.

The GDP and economic growth calculations based on consumption induced mass production may not reflect realism in economics. One of the key roles of Quantity Surveyors' is that they shall advice on best use of resources in terms of construction economics. The current linear industry model works in isolation should not shape the Quantity Surveyors' future role, in resource management for the best value proposition.

They need to embrace natural laws and emulate natural cycles in rethinking value with the primary sense that no survival for human and thus business without natural resources. Thus, we need to adopt appropriate technological and behavioral approaches and work collaboratively with other professions in seeking a solution that will address the depletion of our natural resources.

The information available is much greater now; about urbanization, population growth, waste generation, amount of natural resource mining, greenhouse gas emission and many more. However, pragmatic approaches and decision making for solutions on such encountered issues are not seen in required pace. The researches done on sustainability may be the large majority. The subjects in course syllabi on value management, sustainability, green technology, disaster management etc. have been there for quite a long period. Our ancestors were aware about the cyclical nature of natural laws although the vast amount of information to which we have access today was not available to them. A huge difference exists between possessing clothes and getting dressed. As professionals, we need to ponder about our behavioral aspects first, which will then be reflected in the society and economy.

In such a context, the new technologies can be used effectively in dealing with built environments for collaborative and speedy solution. The model of "one issue at a time" will not work as the linear system of resource use have exposed human being and economies to a number of serious risks already. It is against this backdrop that we selected the theme "Emerging Challenges and Roles for Professionals in Circular Built Environment" for the 2020/2021 Annual Forum.

I would like to take this opportunity to thank all Governing Council Members, Members of College of Past Presidents, Board Members, Corporate Members, all other IQSSL members, IQSSL staff and the stakeholder organizations of the construction industry for their continuous and valuable support extended to IQSSL. Wish them a safe and very successful future.

# Message from the Vice President

As the vice president of the Institute of Quantity Surveyors, Sri Lanka (IQSSL), I am pleased to send this message on the occasion of the 2021 Annual General Meeting of the Institute.

Our theme for 2021 is **"Emerging Challenges and Roles for Professionals in Circular Built Environment"**.

The circular economy aims to alter the consumption and output trends that exert a tremendous strain on the earth and its environmental capability. It is an alternative to the old economic model, "purchase, consumption and dispose". It helps to improve resource efficiency and reduce environmental pollution. Circular economy enhances the financial, social, and environmental value of a building by helping to review the entire building life cycle. Thus, circular built environment has to be integrated into the construction industry to reduce the generation of waste and ensure the sustainability of the industry. Towards this end, the materials used in a building project should be maintained in a closed loop as long as possible and the use of new natural resources should be minimized as much as possible through the use of appropriate practices. These practices should include the maximizing of the life-cycle approach during the useful lifespan of the building, incorporating the end-of-life process into the building design, and using a new ownership model. Thus, construction professionals have to play an important role in achieving the circular built environment.

Construction professionals, such as quantity surveyors, architects, engineers, and facility managers, have the difficult task of comprehending and transforming strategic sustainability goals into sound project-specific actions.



Ch.QS. Prof (Mrs) Kanchana Perera  
BSc.(QS) Hons., M.Phil, F.I.Q.S.SL, FAIQS,  
FRICS, CQS, ICECA  
Vice President - IQSSL

Thus, quantity surveyors, who are expected to manage the costs of construction projects, have to play a major role in the construction industry in uplifting the sustainability of the industry. Although the application of the circular economy concept in construction is still in its infancy, the strategies associated with the concept are being constantly changed. Hence, the investigation of the roles of the professionals in promoting sustainability in the circular built environment construction is important.

The regulators, academia, researchers, professionals, and those involved in the construction supply chain have to work together and find lasting solutions to the challenges faced by the construction industry when establishing the circular built environment. The public expect the professionals, academics, and public officers who have benefitted from free education to act responsibly and make our country a better place for living by focusing on sustainable construction.

Finally, I would like to take this opportunity to acknowledge the support we received from our members throughout the years, without which it would have been almost impossible for the Institute and the quantity surveying profession to be where they are now.

I wish the annual general meeting, technical sessions, and annual forum all success.



# Message from the Secretary

On the eve of ending my tenure as the Secretary of the Institute of Quantity Surveyors, Sri Lanka (IQSSL), it is with a certain degree of self-satisfaction for achieving some of the objectives of IQSSL that I am sending this message on the occasion of the Annual General Meeting 2020/2021 (AGM) of IQSSL.

Considering the health restrictions imposed by the authorities and other impediments experienced due to the prevailing COVID-19 pandemic, the AGM, Annual Forum and Annual Technical Sessions of this year are planned to be conducted online over the Zoom platform. Although the Governing Council and the Boards of IQSSL managed to accomplish some of the objectives as detailed in the Secretaries Report, the prevailing pandemic prevented them from achieving all the targeted objectives.

As the built environment is one of the largest, most energy and material intensive sector locally and globally, the professionals involved in this sector have a key role to play in converting it from a linear model to a circular one that is more sustainable. Hence, the theme of the annual forum: "Emerging Challenges and Roles for Professionals in Circular Built Environment" is a very pertinent topic to explore the challenges faced by the professional in this transition to mitigate the resources consumed by this sector considering the economic hardships experienced by the construction industries locally and globally, especially due to the prevailing pandemic. Quantity Surveyors being advisors, controllers and auditors of costs of construction projects can contribute immensely to find solutions to the challenges faced by the professionals.

IQSSL, as the sole regulating body of the Quantity Surveying profession in Sri Lanka, has been regulating, promoting and maintaining highest level of professional and academic standards of the Quantity Surveyors in Sri Lanka. In particular, IQSSL has taken steps to disseminate and impart knowledge in Quantity Surveying and related subjects through



Ch. QS. Senerath Wetthasinghe  
LL.M., F.I.Q.S.SL, MAIQS, FQSi, FCIArb  
Hony. Secretary - IQSSL

courses of study conducted by the College of Quantity Surveying, the education arm of IQSSL, workshops, short courses, seminars and CPD programmes.

As an extension of such commitments, IQSSL has been conducting technical sessions annually alongside the AGMs for the benefit of Quantity Surveying students and young Quantity Surveyors and to make them aware of current trends and needs of the profession and the construction industry. The Annual Technical Sessions 2021 is a forum for thought provoking presentations to instigate the audience to think afresh.

IQSSL has been recognised by the international Quantity Surveying fraternity as an organisation on a par with other internationally recognised Quantity Surveying institutions and it has been a full member of the Pacific Association of Quantity Surveyors since 2011. IQSSL has signed reciprocity agreements with the Australian Institute of Quantity Surveyors, New Zealand Institute of Quantity Surveyors and the Canadian Institute of Quantity Surveyors.

The Royal Institution of Chartered Surveyors, UK (RICS) has expressed their willingness to sign a reciprocity agreement with IQSSL and the discussions are underway between IQSSL and RICS.

I wish all the best for a prosperous future for IQSSL and fervently hope that all the current members, who support the institute in numerous ways, and prospective members will keep the momentum of growth and take IQSSL to greater heights.



## Report of the Chairperson Board of Quantity Surveying Education and Training



Ch. QS Hasitha Gunasekera

BSc. (QS) Hons., MSc. (Project Management),  
F.I.Q.S.SL, FAIQS.CQS, MRICS, MCIQB  
Chairperson - Board of Quantity Surveying  
Education and Training (BQSET), IQSSL

I am pleased to report on the progress made by the Board of Quantity Surveying Education and Training (BQSET) in its activities during the Session 2020/2021.

Standardising and upgrading knowledge and skills of present and future members of IQSSL is the paramount objective of the BQSET. Accordingly, under the main scope of work, it is entrusted to conduct Assessment of Professional Competence (APC) and to conduct professional level exams from Level 1 to 3. BQSET continued these activities successfully.

During the session, Two APC programmes were conducted in March 2021 and August 2021. Well-structured Charter classes were conducted before each regular APC to guide candidates to appropriately prepare themselves to face APC.

Quality improvements to professional level exams were also considered in high priority. Structured moderation process continued for all assessments. One important step introduced was to preview exam results for students' feedback before finalizing results, which further enhanced the accountability of professional levels results.

The other major scope is the standardization of Quantity Surveying education in the country. This primarily includes accreditation of degree programmes and conduct of Graduate Member Qualifying Examination (GMQE). Identifying the practical challenges faced by candidates and based on their feedback, the BQSET initiate a lecture series for participants for improve their knowledge. During the period, completion of the accreditation criteria has been finalized and new recognitions has been completed and will be initiated from 1st September 2021 onward.

The Board is pleased with its achievements made during the Session 2020/2021, and will continue to make the best contribution towards progress of IQSSL.

## Report of the Chairperson Public Relations and Welfare Board

As the Chairperson of Public Relations and Welfare committee of Institute of Quantity Surveyors Sri Lanka, it is with great pleasure and honor that I present this message on activities and tasks undertaken and completed during 2020/2021 period.

The current pandemic situation has created many hardships to all of us. We have all come to realize how fragile that our lives are. Due to this scenario, we were prevented from any kind of physical activities/events or gatherings during the year under review. However, the Welfare Board managed to initiate several activities in spite of these restrictions for the betterment of our members.

One of the key activities we implemented was to assist Sri Lankan Health Services as a part of our Corporate Social Responsibility during this pandemic period. With the help of valuable donations collected from our members we contributed to this worthy cause to assist the heroes of Sri Lankan Health Services by way of donating roof timber and paint worth of approximately 1 million rupees to the IDH Hospital to refurbish the staff quarters of their hardworking staff. The actual construction of the project was carried out by SL Army and the Director of IDH, Dr. Hasitha Attanayake highly appreciated IQSSL's kind gesture in the hour of need.

We have obtained concessions under professional category for personnel loans from Commercial Bank PLC, DFCC Bank PLC and National Development Bank PLC and the discussions with other banks are still ongoing.

The members of the Public and Welfare Board has initiated a Tree Planting campaign to motivate and encourage our members and the younger generation to build a greener environment.



Ch. QS (Mrs) Yasitha Bulathsinghala  
Chairperson - Public Relations and Welfare  
Committee (PRWC), IQSSL

Public Relations and Welfare Board has been working on obtaining a Professional Indemnity Insurance Policy covering all risks which may arise when practicing as a professional Quantity Surveyor either as a private practitioner or in a Quantity surveying Consultancy firm.

After formulating IQSSL Toastmasters club, welfare Board facilitated to conduct their educational meetings via online Zoom platform due to the Covid 19 Management Guidelines which prevented physical meetings.

We, as members of this Board, are prepared to render our fullest support to this year's AGM and Annual Forum which are scheduled to be held online Zoom platform on 27th August 2021 and 28th August 2021 respectively.

I take this opportunity to convey my sincere appreciation to all committee members namely Ch.Qs Majith Rasila, Ch.QS (Mrs.) Kumudu Rangani, Ch.QS (Mrs.) Nisha Thambugala, Ch.QS Rex Nicholopille, Ch.QS Harshan Amarasekara, Ch.QS Suranga Wickramarathne, Miss Sachini Dissanayake and the Staff of IQSSL secretariat who contributed and extended their support to achieve the completed tasks during 2020/2021.



# Report of the Chairperson Membership Affairs Board

Membership Affairs Board (MAB) during the period 2020/2021 worked towards continuation of the Institute's goal of congregating all Sri Lankan Quantity Surveyors under the national institute.

Primary function of the board is to advise the Governing Council on matters relating to the membership including enrolments for the new memberships and upgrade of the memberships. During this period MAB took efforts to update the details of memberships across all membership categories. In addition to the virtual copy, hardcopy based membership registers have been prepared in Fellow, Associate and Graduate categories.

As the Chairperson of MAB, I observed the exciting interest placed by non- members of Sri Lankan Quantity Surveyors practicing in Sri Lanka as well as abroad Quantity surveyors to join with the institute. Existing members have also shown keen interest in upgrading their membership to match their acquired qualifications and current experience in par with their professional developments.

Our present membership strength as at 05<sup>th</sup> August 2021 is presented in table 1.

Underlying functions and tasks have been successfully performed during the past period with extended support received from MAB members.

Members who have not paid membership subscriptions up to year 2012 had been suspended/expelled memberships and its summary is presented in table 2.

Issuance of identity (ID) cards for Fellow members and Associate members who are paying membership subscription for two (02) years has been commenced. Further, ID cards with the life time validity have been issued for Honorary Life Fellows.

During this period MAB was able to prepare and update a database of Quantity Surveyors who are working in government institutes. Accordingly, 24 Associate members and 292 other members were recorded as working in government institutions.

Necessary steps were taken to collect and maintain a backup copy (soft copy) of the members' database to make sure their safe storage.

Membership route was updated to suit latest developments took place during the last period in co-ordination with PAB.



Ch. QS. Rajitha Dasanayake

BSc (QS) Hons, MSc (Project Mgmt) SL,  
F.I.Q.S.SL, MRICS, AAIQS

Chairman – Membership Affairs Board (MAB), IQSSL

The MAB extended necessary support for amendments and incorporations to IQSSL ACT, including the formulation of Quantity Surveying Registration Board.

I would also like to thank the members of Membership affairs Board, namely Ch.QS (Mrs.) Liyanage Devika, Ch.QS Indunil Seneviratne, Ch.QS Mahinda Gunawardena, Ch.QS. Sanjeewa Dasanayaka, Ch.QS (Ms.) Heshani Gamage and Ch.QS Nuwan Thilakarathne who worked tirelessly to make the board's affairs a success.

Table 1

Category	Updated Member Count 2018 July	Updated Member Count 2019 July	Updated Member Count 2021 August
Fellow	34	36	38
Associate	273	362	393
Graduate	528	573	502
Technical	334	354	435
Probationary	37	36	145
Students	2598	2537	2186
Registered	28	25	18
<b>Total</b>	<b>3832</b>	<b>3923</b>	<b>3712</b>

Table 2

Category	Number of members suspended				Total
	List 1 May 2019	List 2 Nov 2019	List 3 Oct 2020	List 4 Oct 2020	
Fellow	-	-	01		<b>01</b>
Associate	-	-	19	03	<b>22</b>
Graduate	-	-	171	08	<b>179</b>
Technical	-	-	05		<b>05</b>
Probationary	-	-	06	05	<b>11</b>
Registered	-	-	06	01	<b>07</b>
Student	101	497	66	175	<b>839</b>

## Report of the Chairperson Professional Affairs Board

In our life time, the most extraordinary and unique year was experienced in 2020/ 2021. It was a year that we prayed for 'negative' test results and became most humane by avoiding fellow humans. To not to visit, meet and greet anyone was the norm. We were driven to what was termed as 'new normal' and I believe, together with all of IQSSL, PAB adopted well to the 'new normal' context in reaching out to Members.

Seven CPD seminars were conducted on virtual mode during the year touching on many contemporary issues, construction technology and other topics of general interest. It included a programme on application of 5D BIM and QS related software conducted in collaboration with an internationally reputed organization. PAB also collaborated with RICS Sri Lanka in conducting a joint session with much success. Almost all CPDs were well attended.

Two successful short durational programmes were launched during the year for the benefit of industry practitioners to enhance their knowledge, skills and capacities. These programmes were designed for the benefit of wider QS community and were well received by them. They will be conducted repetitively, due to unwavering high demand.

Mandatory requirement of 15 CPD hours for Members was well implemented from end of March 2021, as a key process aimed at enhancement of professional development of Members.

During the year, prolonged negotiations on reciprocal recognition of Member qualifications with Canadian Institute of Quantity Surveyors was successfully concluded while the existing reciprocity with New Zealand Institute of Quantity Surveyors was further extended mutually.

The 'Lion logo' or emblem of IQSSL was registered as a recognized trade mark with copyrights and associated intellectual property rights over its design and usage, to ensure due protection. A brand identity document outlining parameters of logo usage had also been published.



Ch. QS. Nandun Fernando

BSc (QS) (Hons), F.I.Q.S.SL, FAIQS, Attorney at Law,  
Chairperson - Professional Affairs Board (PAB), IQSSL

Existing Code of Professional Conduct and Ethics was extensively reviewed, emphasizing on emerging professional norms and current developments, industry needs and practices of other industry professionals was conducted during the year and distinctively identified changes are to be made in due course.

APC Assessment Guide was prepared with specific details, relevant formats and instructions on APC procedure, applicable criteria and requirements. Processes for selection, periodic appointment and continuous updating of a panel of APC Assessors were finalized.

Discussions were successfully conducted and are set to be held further with experienced partitioners to develop industry and practice-oriented standards in Quantity Surveying.

Such similar discussions were successfully conducted with experienced partitioners on suitability and applicability of existing QS Fee structure. With the input of many, it is being revised to be reflective of current industry needs and norms.

PAB is continuing its close interactions with government bodies and regulatory authorities towards establishment of professional and technical Service Minutes for Qs in the state sector.

All of above activities have been effectively facilitated and made possible by a dedicated group of PAB Members to whom my heartfelt gratitude is extended, together with members of PAB CPD Sub Committee. A special note of appreciation is also offered to members of IQSSL staff for their support.

## Report of the Chairperson Board of Quantity Surveying Publications



Ch. QS. Duleesha Wijesiri

BSc. (QS) Hons, MBA (PIM-SJP),  
A.I.Q.S.S.L, MRICS, Dip (Arb)

Chairperson - Board of Quantity Surveying  
Publications (BQSP), IQSSL

Amidst the challenging times everyone went through during the last year or so, I am happy to report that the Board of Quantity Surveying Publications (BQSP) concluded another successful tenure.

With the objective of effectively communicating the IQSSL's information to the membership as well as to the public in an accurate and timely manner, the Board continued the good work started during the previous year and in addition initiated several new activities with the help of my dynamic board members and sub-committee members.

One of the key achievements of the year was in introducing an Online Payment Gateway to our new website where all the Corporate Members and Technical Members are now able to pay their annual subscription fees online via their individual accounts in the IQSSL Official Website. In addition, the Corporate and Technical Members are now able to pay for the CPD programmes through this Online Payment Gateway as well. This new feature was quite convenient to the members especially during the pandemic period and helped in enhancing membership fees income to the Institute.

Our Board initiated a Students' Article Competition amongst the Quantity Surveying students in Sri Lanka and many interested students took part in this competition. The evaluation of the articles is currently underway by an expert panel of academics and the winners of the article competition are expected to receive cash prizes. Writers of all selected articles will receive a valuable certificate as well as their articles will be published in the Focus Magazine, issued quarterly by IQSSL.

Furthermore, BQSP continued timely and accurate dissemination of IQSSL news and information via the official website <https://www.iqssl.lk/> and through the Facebook Account.

The BQSP also continued the publication of quarterly e-journal "Focus" during the last year and we successfully issued four (04) publications as planned.

We sincerely thank Ch. QS Prof. (Mrs) Kanchana Perera, Dr. (Mrs) Udayangani Kulathunga, Dr. Mrs. Tharusha Ranadewa and Mr. Dharshaan Vijayanandha for their invaluable contribution as the Editorial Board of Focus Journal. I take this opportunity to invite all our readers to send your valuable articles to be published in our journal so that we can be a platform for you to disseminate your valuable knowledge and experience.

In addition, BQSP is currently engaged in carrying out the first revision of IQSSL's Corporate Profile Brochure, publication of IQSSL's Procedure Manual and also IQSSL's History Book.

I personally thank my dynamic board members (namely, Ch. QS Mahinda Gunawardena, Ch. QS. Prasad Dissanayake, Ch. QS Buddhika Perera, Ch. QS Dhamisha Sriyananda, Ch. QS Majith Rasila, Ch. QS Iresha Gamage) and sub-committee members (namely, Dr. Mrs. Roshani Palliyaguru, Mr. Dharshaan Vijayanandha, Dr. Mrs. Tharusha Ranadewa, Ms. Savindee Ruapasinghe, Mr. Nimesh Priyamantha, Mr. Sandun Senanayake) for their unstinting cooperation for the activities of the BQSP. Also I take this opportunity to thank Mr. Lahiru Fernando for the assistance in maintaining our website as well as Mr. Mahinda Gunathilake and the staff of the Secretariat for assisting the BQSP in numerous ways.

## Report of the Chairperson Financial Affairs Board

I consider myself privileged to provide this message on the occasion of Annual General Meeting 2020/2021.

As the Chairman of Financial Affairs Board I have the pleasure to state that under the dedicated commitment of board members & governing council, IQSSL had succeeded in further strengthening the stability of our financial reserves during the financial year starting from 1st April 2019 to 31<sup>st</sup> March 2020. Although majority of our members were employed and residing in overseas, collection of membership subscription fees has stayed very close to the 2019 numbers during the financial year. Fixed financial reserves also had improved as a result of income generated from College of Quantity Surveying and annual subscription fees from the membership.

IQSSL had also initiated a fund management process to enhance and improve the financial strengthening of the Institute which had continued during current 2019-2020 financial year. With the concurrence of the governing council, IQSSL had increased the FD investments to 69.5m up from 43.8m in 2019. However, the FD interest dropped to 3.4m from 4.6m in 2019/20 due to significant FD rate dropping experienced. During the period under review IQSSL had an income tax liability of Rs. 2,662,278.00.

During the 2020/2021 (unaudited financial year which will be reported next year), IQSSL had also rigorously pursued and had been successful with the Urban Development Authority for the allocation of 27 perches of land from Colombage Mawatha Kirulapoana on a 30-year lease period.



Ch.QS Indunil Seneviratne

BSc (QS) Hons, MSc (Construction Mgmt) USA,  
F.I.Q.S.SL.

Chairperson - Financial Affairs Board (FAB), IQSSL

In total, Rs. 25,065,112.77 had been paid to the UDA as the processing fee and the lease amount in this regard.

IQSSL also had incurred an employee compensation settlement amounting to Rs 575,000 during the same financial year. Further, an estimated Rs. 17.3m will also be set off as initial funding to the IQSSL College of Quantity Surveying Guaranteed limited which had started operations from 11th April 2020.

As the Chairperson of the Financial Affairs Board, I hereby appreciate all the invaluable inputs and advices given by all FAB board members namely Ch.QS A N Jayadeva, Ch.QS. Rajitha Dasanayake, Ch.QS. Jagath Basnayake, Ch.QS Mahinda Gunawardane, Ch.QS Shammi F. Hannan, Ch.QS Majith Kodithuwakku. Further my gratitude goes to Accounting and secretariat staff of IQSSL, The President IQSSL, The Honorary Secretary IQSSL and other members of Governing Council of IQSSL. They had given me incredible assistance in performing my activities to achieve a successful financial year 2019/20 for IQSSL.



Research Article

# Compressing Construction Periods through Collaborative Approaches of Building Professionals

Archchana Shandraseharan (archchanas@uom.lk)

Temporary Lecturer, Department of Building Economics, University of Moratuwa, Sri Lanka

Construction industry is not famous in terms of project completion within time. Many projects start with good ideas, huge investments and great efforts (Vasista 2017). However, most of them do not achieve much success. One of the major contributions to unsuccessful projects is the lack of time management. It is observed that many construction projects face the issue of time overrun worldwide both in developing and developed countries (Tafazzoli 2017; Olawale and Sun 2010). Authors in Moura et al. (2007) stated that more than 40% of projects in construction industry experiences time overrun. Traditionally, construction projects were perceived as successful when they meet time, budget and performance goals (Shenhar et al. 2001). Therefore, one of the major contributions to unsuccessful projects is the lack of time management. Hence, compressing construction periods by managing the time overruns is significant in construction industry.

Compressing construction periods will be possible by understanding the causative factors of time overruns and addressing them with appropriate strategy. Accordingly, financial issues faced by the contractor, contractor's inexperience, weather impacts, late delivery of material, mistakes in design, shortage of skilled labor, incompetent subcontractor and mistakes in time estimation were identified as main causes of time overrun in construction (Soomro et al. 2019). Meantime, different stakeholders are being responsible for delay in construction projects (Akhund et al. 2017). Since the stakeholders being the key determinants of project success (Mok et al. 2018), play a major role in almost every project towards accomplishing project tasks and issues of cost and time overruns (Ahmad et al. 2018). Therefore, it is necessary to identify the needs of the stakeholders and establish appropriate communication procedures among them (Meyer and Kara 2020; Hutchinson et al. 2017).

Collaborative teamworking of construction stakeholders will enhance the stakeholder management and success of the project, as it will provide a successful contractual relationship in construction projects (Rahman et al. 2014). The study of Mydin et al. (2014) investigated the influential causes of time overrun in Malaysian private housing projects through a questionnaire survey. According to the above study, among the identified top 10 common and highly severe factors of time overrun, lack of coordination with other construction stockholders considered in this study as a way of construction time performance management strategy. Dispute among stakeholder always cause both the cost and time overrun in the construction projects (Spang & Riemann, 2014). In the light of literature review one can conclude construction industry is very complex and always face new challenges. Project to project and organization to organization structure and working methods are different also a lot of expertise need from different group of people. The project is not own by single person or firm it is among stakeholders.

Collaboration is always in the interest of each stakeholder and has many benefits besides sharing the work for hiring different. Collaboration is the legal documented relationship establishment between companies or firms to share mutual interest and improve the performance of the project to reduce delays and cost also to maintain or improve the quality of work (Ahman et al. 2018). Bygballe & Ingemansson (2014) has explained some benefits of collaboration in construction as through proper collaborative process technical solutions and innovations of high quality can be achieved. Other benefits of collaboration include; reduction of the cost of the project for the project owner; contractors will gain high profits; the projects will be completed early and there will be fewer disputes among the contractors (Ahman et al. 2018). Following figure visualizes the above findings.



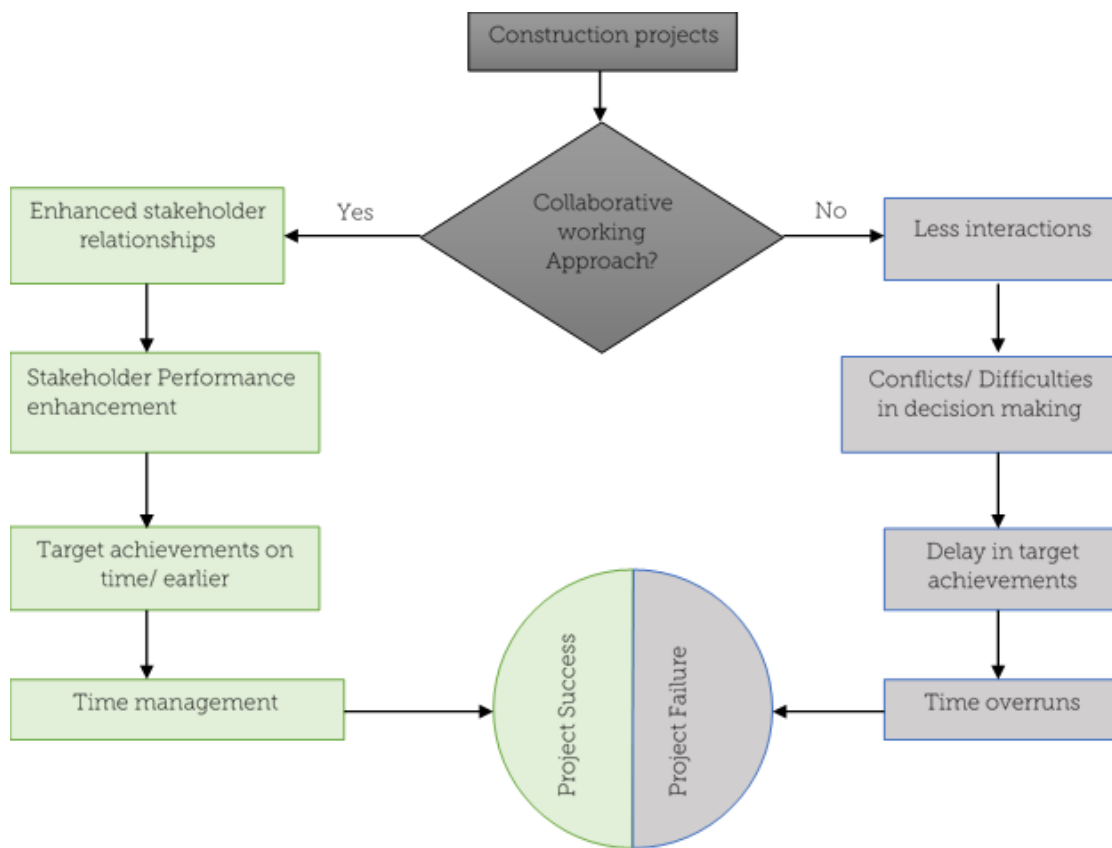


Figure 1: Theoretical Conceptual Framework

However, in the era of advancement construction industries are suffering collaborations issues all over the world which push the industry in the result negative impact has been noted (Mirawati et al., 2015). Several studies have been conducted to study the cost overrun and delays factors. Similarly, problem of delays and cost overrun caused because of ineffective collaboration among the stakeholders also discussed in the literature. The statistics revealed that collaboration has effect on the construction projects are facing serious issues of cost overruns and delays (Ahman et al., 2018). Therefore, it becomes an evidence from the literature for the need of collaborative working of stakeholder for the time management in construction projects.

## References

Ahmad M, Saleh M, Dash A. 2018. Collaboration impact on the performance in construction projects: Case study Selangor Malaysia. IJSART, 4(1).

Akhund MA, Khoso AR, Memon U, Khahro SH. 2017. Time Overrun in Construction Projects of Developing Countries. Imperial Journal of Interdisciplinary Research (IJIR), 3(5):124-129.

Bygballe LE, Ingemansson M. 2014. The logic of innovation in construction. Industrial Marketing Management, 43(3):512-524

Hutchinson NJ, O'Leary TR, Ma T. 2017. An analysis of stakeholder management in design & build projects in South Australia, from a client's perspective. CRIOCM 2017 Conference.

Mirawati N, Othman SN, Ismail Rm. 2015. Supplier-contractor partnering impact on construction performance: A study on Malaysian construction industry. Journal of Economics, Business and Management.

Mok K, Shen G, Yang R. 2018. Stakeholder complexity in large scale green building projects: a holistic analysis towards a better understanding. Eng. Constr. Archit. Manag. 25(11):1454-1474.

Moura HMP, Teixeira JMC, Pires B. 2007. Dealing with cost and time in the Portuguese construction industry. CIB World Building Congress, Cape Town, South Africa.

Olawale YA, Sun M. 2010. Cost and time control of construction projects: inhibiting factors and mitigating measures in practice. Construction Management and Economics, 28(5):509-526.

Rahman SHA, Endut I, Faisal N, Paydar S. 2014. The importance of collaboration in construction industry from contractors' perspectives. International Conference on Innovation, Management and Technology Research, 129, 414 – 421

Shenhar AJ, Dvir D, Levy O, Maltz AC. 2001. Project Success: A Multidimensional Strategic Concept. Long Range Planning, 34, 699-725.

Soomro FA, Memon MJ, Chandio AF, Sohu S, Soomro R. 2019. Causes of time overrun in construction of building projects in Pakistan. Engineering. Technology & Applied Science Research, 9(1):3762-3764

Spang K, Riemann S. 2014. Partnering in infrastructure projects in Germany. Procedia-Social and Behavioral Sciences, 119, 219-228

Tafazzoli M. 2017. Dynamic Risk Analysis of Construction Delays Using Fuzzy-Failure Mode Effects Analysis, PhD Thesis, University of Nevada, USA.

Research Article

# Readiness of 5D BIM implementation: The case of Sri Lanka

Thilina Vitharama - Construction Cost Information Services

Extracting the quantities, counting building elements and taking off measurements are important for cost planning, cost controlling, cost management and procurement of construction projects (Kulasekara et al., 2013). The reliability of cost estimation depends on the accuracy and the quality of the quantities. Also, following a proper quantity take-off procedure is important for the cash inflow and cash out flow of a construction project (Ismail et al., 2013). Cash inflow means payment received from the owners, the cash outflow means contractors' expenses (Kishore et al., 2011). The labour, material and equipment cost, sub-contractor payments and overhead can be considered as cash out flows. In Sri Lankan context, most of the construction related entities use AutoCAD 2D software and Microsoft Excel for preparation of quantity reports for detailed estimations (Lee et al., 2011). Figure 1 presents a comparison between traditional method of quantity take off with the modern method of quantity take off.

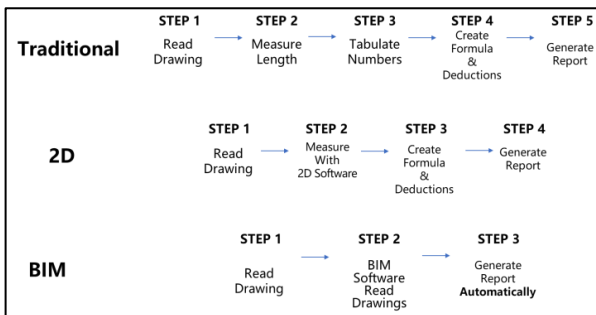


Figure 1: Comparison of sequence of quantity take off between traditional, 2D and 3D Source: Ting (2021)

Due to high time consumption and the less accuracy of the estimations, the construction practitioners search for better alternatives for cost estimations for over the years (Cui et al., 2011). With the rapid changing of interconnectivity of information technology and construction technology, Building Information Modelling (BIM) has become a popular tool in construction industry (Kim et al., 2014).

BIM is a physical or a functional characteristic of a building. "BIM gives architecture, engineering, construction and operation (AECO) professionals challenges and opportunities for efficient planning, design, cost and time management, construction planning." (Autodesk, 2017). For preparation of detailed cost estimations, 5D BIM has become a popular alternative all over the world. The 5D BIM can be interpreted as an intelligent link between 3D model and cost information. 5D BIM provides 10% accuracy and 80%-time efficiency comparing to the traditional way of quantity extraction and cost estimating (Jayasena and Wedikkara 2012).

When considering Sri Lankan approach to the adaptation of the BIM technology, Sri Lanka is still in the preliminary stage (Jayasena and Wedikkara, 2012). It is important to promote BIM technology and implement BIM policy in the country for the betterment of the construction industry in Sri Lanka (Jayasena et al., 2018). The aim of this study is to analyse the readiness of 5D BIM implementation in the Sri Lankan context. Therefore, the research consists of two objectives as, to get comprehensive knowledge regarding concept of 5D BIM, identify issues/ limitation to pertaining to implementation of 5D BIM in Sri Lanka. Expert interviews were conducted to collect the data and content analysis used to analyse the collected data.

## Introduction to 5D BIM

### BIM Concept

The term BIM was introduced in year 1970. The basic functionality of BIM has been identified as producing, communicating and analysing building models (Eastman et al., 2012). The introduction of BIM changed the way of operation of construction drastically (Olatuni and Sher, 2015).

Building Information modelling cannot be considered as an individual software. BIM provides a common platform for integrating software to design, estimate and construction planning (Jayasena and Wedikkara, 2012). The stakeholders can provide their involvement in this common platform throughout the life cycle of the project. The main benefit of BIM has been identified as reducing the financial and other potential risks of building projects through better coordination with stakeholders, analysing, monitoring and visualizing building projects (Wu et al., 2014).

### 5D BIM

5D BIM consists of symmetric information and geometric information of construction projects. The material schedules, material prices and cost data come under symmetric data and the extracted quantities for building elements are considered as geometric data (Lu et al., 2015).

The functionality of 5D BIM software can be categorized in three steps. First step is preparation. The next step is modelling and the final step is linking the symmetric information and the geometric information for preparation of cost estimation or BOQ.

In the first step, the drawings should be carefully studied and the scope of items that is subjected for estimation should be properly identified. In the modelling stage, the BIM model should be close to actual construction as much as possible. The accuracy and reliability of quantities depend on the quality of the BIM model. In the final stage, the cost data and quantity data should be carefully linked with each other to finish the estimation (Lu et al., 2015). During the quantity take off period, it is important to follow particular rule of measurement (NIST, 2012). It will give uniformity for the cost calculation. Figure 2 presents the process of 5D BIM quantity take off and compatibility of 5D BIM software with the various drawing formats.

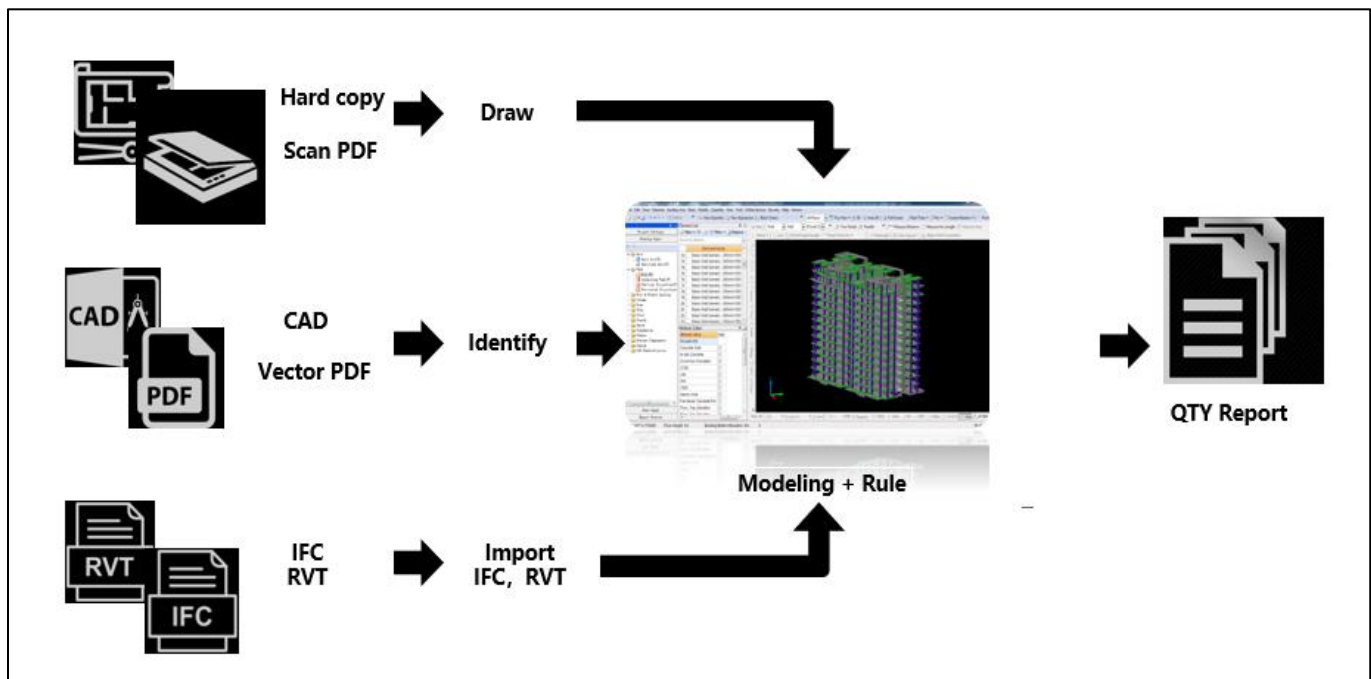


Figure 2: The process of Quantity take off by using 5D BIM software Source: Wang (2020)



## Applications of 5D BIM

Mostly, 5D BIM software is compatible with the AutoCAD 2d drawings, PDF drawings, Revit IFC files and JPG drawings. 5D BIM software can be used for preparing BOQs, estimation, quantity reports, progress claims, preparation of variations, value engineering and value management functions and procurement throughout the project life cycle (Wu et al., 2014). 3D visualization with model, clash detection, ability of quantity reversely checks the model and ability to share symmetric and geometric information in common platform are common benefits of 5D BIM software (Babatunde and Perera 2017).

## 5D BIM and Quantity Surveying

Many researchers emphasised that it is important to have knowledge regarding traditional Quantity Surveying to operate 5D BIM software (Settineni and Balford, 2012). Also, 5D BIM modeler should have enough knowledge and capability to read and understand the drawings prior to the modelling. During the modelling, it is important to be mindful about every small detail to complete a perfect model (Hong et al., 2019). The unique feature of BIM based cost estimation is that it will automate the quantity take off procedure. It will eliminate some time-consuming procedures in cost estimation process. Also, with the 3D visualization prior to quantity extraction gives the 5D BIM modeler better understanding of the quantities (Chan et al., 2019). It will lead to generate more accurate quantity reports and reliable cost estimations. The speed of quantity extraction will be increased with constant practice and spend more time with the software (Ashworth, 2010). The ability of quick and accurate cost estimate will increase the confident level of the 5D estimator or the Quantity Surveyor (Chuan and Sheng, 2017).

## Methodology

Data were collected through semi-structured interviews with experts. 5 experienced Quantity Surveyors were selected through purposive sampling.

Following Table 1 present the profile of the experts.

Table 1: Profile of the experts

Code	Discipline	Experience in Construction	Experience in BIM
RI 1	Quantity Surveyor	>25	2 years
RI 2	Quantity Surveyor	>15	5 years
RI 3	Quantity Surveyor	>13	3years
RI 4	Quantity Surveyor	>13	3years
RI 5	Quantity Surveyor	>13	2 years

The interview guideline was targeted on application of 5D BIM and barriers for implementation of 5D BIM in Sri Lanka. The data were analysed using code based content analysis.

## Research Findings

### Benefits of implementation of 5D BIM in Sri Lanka

According to the expert opinions the main benefits of implementation of 5D BIM have been identified.

1. The accuracy of the quantities will be increased compared to the traditional method.
2. The clarity of work will be increased.
3. If contractors implement 5D BIM in their entities the chance to win tenders will be increased.
4. With the high-tech capacity of 5D BIM users their reputation in the industry will be highlighted.
5. The workload of Quantity Surveyors will be reduced.
6. The smoothness of communication through organization hierarchy will be increased.
7. The internal collaboration between employees will be increased.
8. With visualized modelling the conflict between Quantity Surveyors and other stakeholders will be reduced.

Even though there are lot of benefits of 5D BIM technology, however few barriers pertaining to the implementation of 5D BIM in Sri Lanka as discuss in the next sessions.



## **Barriers for implementation of 5D BIM in Sri Lanka**

According to the opinions of industrial experts, technical issues, social and cultural issues, issues related to the knowledge and education, financial issues and issues related with government policies and legislations have been identified as issues and considerations related to the implementation of 5D BIM in Sri Lanka.

### **Issues related to Quantity Surveying practice**

According to the RI 1's opinion, "Prior to making a decision for implementing 5D BIM to the Quantity Surveying firms or companies, it is highly concerned about the accuracy and the quality of the quantities". Also, most of the entities follow standard method of measurement. Therefore, quantity extraction is to be done according to the standard method of measurement the respective company has been used. Most of the companies question the compatibility of 5D BIM measurement with Standard method of measurements. The formality and the customization of the quantity reports have been identified as prime concern when implementing the 5D BIM in Sri Lankan construction firms.

RI 4 emphasized that Preliminary cost estimations, whole life cost calculation, elemental cost planning cash flow forecasting, preparation of subcontractors valuations, interim payment valuations, progress claims and preparation of variation orders have been identified as common Quantity Surveying functions in a lifecycle of a construction project. Construction companies and QS consultancy firms doubt how the application of 5D BIM would increase the efficiency of above-mentioned functions. Also, application of 5D BIM for quantity extraction of complex building elements like ramps, roofs, staircases will be questioned by entities before they make a decision for the implementation of the software in their entities. How to determine the cut and fill reduce levels, quantification of undefined elements, align building elements with each other while modeling, clash detection, ability to check the quantities with the

model, change heights and make angles for elements are other common applications for implementation and application of 5D BIM in Sri Lanka related to Quantity Surveying practice.

### **Issues related to knowledge and education**

RI 2 stressed that "Issues related to the knowledge and education is the most frequent issue". Also, RI 2 emphasized that even though most of the universities and institutions included the BIM technology to their curriculums, the students do not have enough practical knowledge regarding BIM software to practice BIM in the industry. Most of the construction practitioners have adequate theoretical knowledge regarding 5D BIM. Hence, BIM technology is a new trend in construction industry. University students tend to select BIM as their final year research topics as well. Also, many young Quantity Surveyors show a great interest to learn the practical applications of 5D BIM software. The lack of industry professionals to teach the application of 5D BIM software has been identified as the cause of this issue.

### **Technical issues**

RI 3 highlighted that "the technical competence of Sri Lankan construction professionals is in preliminary level comparing to other countries". The civil engineers, designers, quantity surveyors and other professionals are reluctant to evolve with the current technological advancements in the world. One of the major impediments for implementation of 5D BIM to Sri Lankan construction entities is their low-capacity computers and other technical devices. Also, RI 3 emphasized that, Sri Lankan construction professionals and managers have a common opinion that it is required to have great IT knowledge to install and function the 5D BIM software. Most of them are unconfident of the IT knowledge they already have. Most of the companies over the world tend to adopt e-tendering rather than using traditional way of tendering during the pre-contract stage of a construction project. In Sri Lanka, construction professionals are reluctant to change the traditional method rather than adopting the e-tendering emphasizing the technological complexity of the process.



## Social and cultural issues

RI 5 stated that "BIM provides a common platform for the design and construction for all the stakeholders to provide their involvement throughout the life cycle of the construction projects". In Sri Lankan construction companies, the operation of the construction has been divided into different departments and the coordination between departments is comparatively low. Also RI 5 highlighted that "Communication between designers and estimators" is very important for the functionality of 5D BIM software. Also, the 3D models of different disciplines should be synchronized to finalize the cost reports. Therefore, there should be no boundaries between departments and all the organization culture should provide opportunity to work collaboratively for a common objective. Also, RI 1 said that "Sri Lankan construction professionals are reluctant to overlap their professional boundaries. As an example, the Quantity Surveyors are reluctant to learn information technology, architectural designs, structural designing, software engineering and other construction related skills emphasizing professionals should only focus to their core job rather than having knowledge regarding other disciplines". This attitude has been identified as a social issue for implementation of BIM in Sri Lankan construction industry. Most of the companies have a vision to generate job opportunities for people in Sri Lanka to upgrade their lives. RI 2 had an opinion that introduction of 5D BIM quantity surveying will be a threat to job opportunities of traditional Quantity Surveyor. The generation gap also identified as a common problem for implementation of 5D BIM technology in Sri Lanka. Most of the Quantity Surveyors who work at top managerial positions in construction companies have been using AutoCAD 2D software and Microsoft Excel since long and they resist adapting new technologies.

## Financial issues

According to the RI 1's opinion, "the initial cost for implementation of 5D BIM software in construction firm is comparatively high".

The company owners and investors think about the return of investment from the software before they implement the software in their companies. In Sri Lanka, there is very a smaller number of companies have already implemented the software for their cost management activities. Very less projects have used 5D BIM for their cost management activities. Therefore, Sri Lankan construction industry does not have examples to analyse the efficiency before making a decision to purchase the software. Also, Sri Lankan construction companies worry about the cost for upgrading in computer hardware and software to be compatible with the software, cost for training and development and the cost of new updates of the software versions.

## Issues related to government policies

RI 1 emphasized that "unavailability of a government policy for BIM has been identified as a big issue for the implementation of 5D BIM in Sri Lanka. Most of the mega scale construction projects in Sri Lanka are done with the intervention of Sri Lankan government. Sri Lanka does not have completed construction projects in which BIM technology was already applied". Therefore, Quantity Surveyors do not have opportunity to practice 5D BIM in Sri Lanka. Because of that education institutes and universities are not encouraged to do research and 5D BIM training in their entities. RI 3 emphasized that the lack of awareness of global technological advancement of responsible authorities has been identified as reason for not having BIM policy in Sri Lanka. Also, government does not encourage by providing funds for the research and development of digital construction have been identified as a great issue for implementation of BIM technology in Sri Lanka.

## Conclusion

The efficiency of construction cost management has been identified as a critical factor for the success of a construction projects process. 5D BIM is one of the most popular tools which use to increase the quality, reliability and accuracy of cost estimations. 5D BIM technology have been using globally over the years and many projects successfully completed by using BIM technology.

However, 5D BIM technology is very new to Sri Lankan construction industry. In this research the characteristics of BIM and the 5D BIM have been discussed using literature and the issues and considerations for the implementation and application of 5D BIM have been identified through expert interviews. The issues related to the Quantity Surveying practice, technical and financial issues, issues related to education and knowledge, social and cultural issues and issues related to the government policies have been identified as major issues..

Sri Lanka has well experienced and educated Quantity Surveying professionals who have already established their good names locally and globally. They have to take a step forward to implement 5D BIM technology in Sri Lanka for the betterment of the industry. By using 5D BIM the quality, accuracy, the reliability, and the speed of estimation can be achieved. Adaptation of BIM technology will be important to accelerate the speed of construction process and avoidance of cost overruns which is important to increase the efficiency of local construction projects.

## Recommendations

The software companies that produce 5D BIM software has been using newest technology to provide functions in their software to address most of the problems facing by Quantity surveyors during their work life. Therefore, adopting to the 5D BIM technology would increase the job satisfaction of the Quantity Surveyors.

The government should take the lead to conduct 5D BIM training to give hand on experience for Sri Lankan Quantity Surveying students to have better idea regarding 5D BIM technology. With the construction boom in Middle East countries, a lot of locally graduated Quantity Surveyors practice in Middle East countries. Hence the Middle East countries have been using BIM software over the past decade, they can share their experience. Thus, implementation of Sri Lankan BIM forum or a society is imperative.

The educational institutions and lecturers should emphasis the importance of overlapping professional boundaries to have a successful career. The knowledge regarding computer programming languages and data base management should be included to the university curricular. The top rank companies must invest money for research and development. There are a lot of testimonies and success stories on digital construction.

The government has a great responsibility to promote and implement BIM technology for the betterment of Sri Lanka. The professional bodies and industry experts have to give their insights regarding making sustainable BIM policy for Sri Lankan construction industry. The critical analysis should be done to convince the government regarding financial gain that could achieve in future if Sri Lankan construction industry adapt to BIM technology. Also, government has the responsibility to provide enough funds for the research and development regarding BIM technology.

## References

- Anoop Sattineni, Harrison Bradford. (2011). Estimating with BIM: A Survey of US Construction Companies. *proceedings of the 28th ISARC (pp. 23-32). Soul: Korea.*
- Daniel W.M. Chan, Timothy O. Olawumi, Alfred M.L. Ho. (2019). Perceived benefits of and barriers to Building Information Modelling (BIM) implementation in construction: The case of Hong Kong. *Journal of Building Engineering, 12 -22.*
- Dong-Eun Lee, Tae-Kyung Lim, David Ardit. (2011). An Expert System for Auditing Quality Management Systems in Construction. *Computer - aided civil and infrastructure engineering, 376 -389.*
- Gemunu Kulasekara, Himal Suranga Jayasena, KATO Ranadewa. (2018). Comparative Effectiveness of Quantity Surveying in a Building Information Modelling Implementation. *The Second World Construction Symposium 2013: Socio-Economic Sustainability in Construction (pp. 99-65). Colombo: Ceylon Institute of Builders - Sri Lanka.*
- Himal Suranga Jayasena, Chithra Weddikara. (2012). Building Information Modelling for Sri Lankan Construction Industry. *Global Challenges in Construction Industry (pp. 196-201). Colombo: Ceylon Institute of Builders - Sri Lanka.*
- Himal Suranga Jayasena, M.K. Chamitha Sanjani Wijewickrama, Nirmala Kolugala. (2018). Open BIM Adoption in Sri Lankan Construction Industry. *FOSS4G Asia 2018. Moratuwa: University of Moratuwa Moratuwa.*
- Noor Akmal Adillah Ismail, Maria Chiozzi, Robin Drogemuller. (2017). An overview of BIM uptake in Asian developing countries. *AIP Conference Proceedings (pp. 10 -15). America: American Institute of Physics.*
- Qingbin Cui, Makarand Hastak, Daniel W. Halpin. (2010). Systems analysis of project cash flow management strategies. *Construction Management and Economics, 361 - 376.*
- Simon Ashworth, Matthew Tucker, Carsten K. Druhmman. (2019). *requirements (EIR) for BIM. Emerald Publishing Limited, 103 -119.*
- Solomon Olusola Babatunde, Srinath Perera. (2017). Barriers to bond financing for public-private partnership infrastructure projects in emerging markets: A case of Nigeria. *Journal of Financial Management of Property and Construction, 3 -20.*
- Song Wu, Gerard Wood, Kanchana Ginige, Siaw Wee Jong. (2014). A Technical Review of BIM based Cost Estimating In UK. *International Council for Research and Innovation in Building and Construction, 8 -10.*
- Varun Kishore; Dulcy M. Abraham, A.M.ASCE; and Joseph V. Sinfield. (2015). *Portfolio Cash Assessment Using Fuzzy Systems Theory. Joint Risk Management Section, 18 -25.*





## IQSSL Board Members and Subcommittee Members for the Year 2020/2021

No	Board	Board Members	Sub-Committee Members
1	Professional Affairs Board	Ch. QS Nandun Fernando (Chairman) Ch.QS Jayantha Jayakody Ch.QS (Mrs.) Devika Liyanage Ch.QS Manoj Thudugala Ch.QS Sumith Lokuge Ch.QS Gayan Fernando	Ms. Dharshani Karunarathne Ch.QS Nimantha Manangoda Ch.QS Nuwan Thilakarathne Ch.QS Venura Weerakkody Ms. Dinusha Munasinghe
2	Membership Affairs Board	Ch.QS D.M.P.R. Dasanayake (Chairman) Ch.QS M.M.N. Gunawardana Ch.QS L.D.I.P. Seneviratne Ch.QS (Ms.) L. Devika Ch.QS D.M.K.S.J. Dassanayake Ch.QS (Ms.) M.G.H.D. Gamage Ch.QS N.T. Thilakaratne	
3	Board of Quantity Surveying Education and Training	Ch.QS D.M.H. Gunasekera (Chairman) Ch.QS R.T.J. Wijesinghe Ch.QS K.A.T. Pushpakumara Ch.QS (Mrs.) K.A. Gunasekera Ch.QS Dr. (Mrs.) A.S. Waidyasekara Ch.QS K.D.L. De Silva Ch.QS (Ms) K.G.M.C. Samarajeewa Ch.QS (Ms) Chamari Allis	<b>Accreditation</b> Ch.QS Dr. (Mrs.) A.S. Waidyasekara Ch.QS Dr. (Mrs.) T. Ramachandra Dr. (Mrs) M. Thayaparan <b>Quality Assurance</b> Ch.QS (Mrs.) K.A. Gunasekara Dr. (Mrs) U. Kulatunga Dr. (Mrs.) K.A.T.D. Ranadewa <b>APC</b> Ch.QS Tilanka Wijesinghe Ch.QS J.A.J.C. Jayakody Ch.QS K. Danushka Lakshan De Silva
4	Board of Quantity Surveying Publications	Ch.QS B.D.S. Wijesiri (Chairman) Ch.QS M.M.N.Gunawardana Ch.QS Buddhika Perera Ch.QS (Ms) D.H. Sriyananda Ch.QS Prasad Dissanayake Ch. QS Majith Kodithuwakku Ch. QS (Ms) Iresha Perera	Dr. (Mrs.) Roshani Palliyaguru Mr. Dharshaan Vijayananda Dr. (Mrs.) Tharusha Ranadewa Mr. Sandun Senanayake Mr. Nimesh Priyamantha Ms. Savindee Rupasinghe
5	Public Relations and Welfare Board	Ch.QS Mrs. Yasitha Bulathsinghala (Chairperson) Ch.QS Majith Kodithuwakku Ch.QS (Mrs) Kumudu Rangani Ch.QS (Mrs) Nisha Thambugala Ch.QS Rex Nicholapillai Ch.QS Suranga Wickramarathne Ch. QS Harshan Amarasekera	Ms. Sachini Dissanayake
6	Financial Affairs Board	Ch.QS Indunil Seneviratne (Chairman) Ch.QS Rajitha Dasanayake Ch.QS A N Jayadeva Ch.QS Jagath Basnayake Ch.QS Mahinda Gunawardane Ch.QS Shammi F. Hannan Ch.QS Rasila Marjith Kodithuwakku	

## Associate Members who have been successful at the APC Examination held in March 2020

		
Ch.QS K. Sayanthan (AG 2391)	Ch.QS N.M. Kumarapperuma (AG 2239)	Ch.QS O.D.P.C. Vithanage (AG 2415)
		
Ch.QS P.D.K. Fernando (AT 1609)	Ch.QS (Ms.) M.A.R.N. Kularathna (AG 2271)	Ch.QS Ms. A.D.D. Surangani (TS 1198)
		
Ch.QS (Ms.) N.T.S. Tilakaratna (AG 0118)	Ch.QS (Ms.) E.W.S.N. Ariyaratna (AG 1771)	Ch.QS (Ms.) G.H.K. Priyadarshani (AG 1512)



## Associate Members who have been successful at the APC Examination held in March 2021



Ch.QS K.M.S.J.N. Peiris  
(AA4711)



Ch.QS L.A. Kularatne  
(AA 4715)



Ch.QS D. Samarawickrama  
(AA 4720)



Ch.QS W.D.A. Kithsiri  
(AG 0086)



Ch.QS G.J.R.P. Silva  
(AG 0087)



Ch.QS M.S.R.S. Gunarathna  
(AG 0097)



Ch.QS W.M.J. Wilegoda  
(AG 0363)



Ch.QS R.M.M.U.A. Mapa  
(AG 1257)



Ch.QS H.W.L. Chamara  
(AG 1421)



Ch.QS A.G.M. Mufas  
(AS 1258)



Ch.QS A.B.C.R. Dias  
(AS 2146)



Ch.QS (Ms.) A.K. Ranasinghe  
(AG 0361)



Ch.QS (Ms.) A.U.J. Muhandiram  
(AG 0525)



Ch.QS (Ms.) I.S. Gamage  
(AG 2356)



Ch.QS (Ms.) A.M.I. Aberathna  
(AT 1109)





# Memories of the Last Two Years



AGM 2019 / 2020



PAQS 2019



Donations to IDH



Unveiling of Past President's Photograph



Inauguration of Professional Level Course

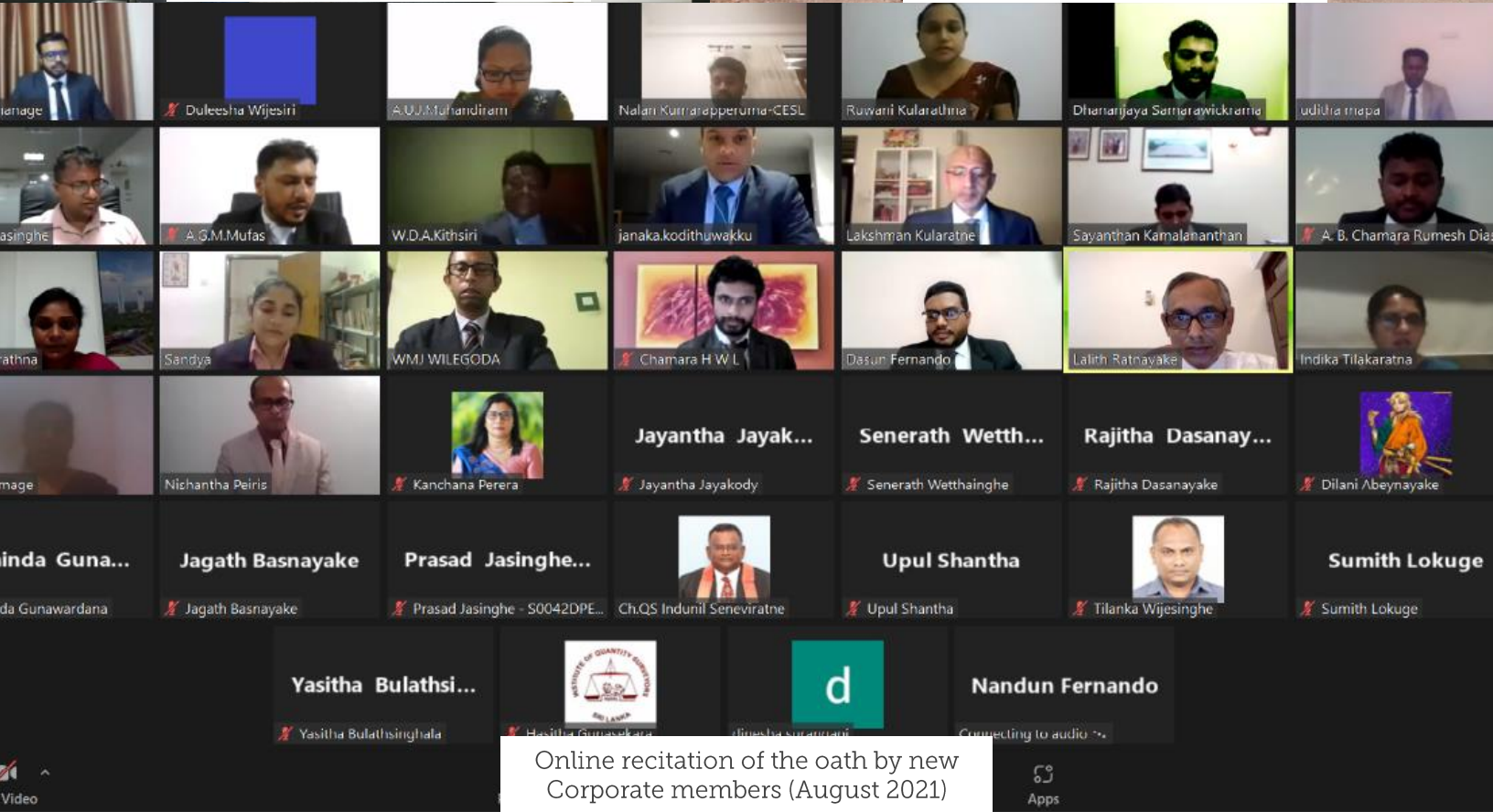




Kick-off meeting for the Proposed Secretariat and College



Proposed site for the IQSSL Secretariat and College



Online recitation of the oath by new Corporate members (August 2021)



Sponsors Appreciation Ceremony



Technical Members' Get-together





[www.iqssl.lk](http://www.iqssl.lk)