

Incorporating Sustainable Procurement Practices in the Construction Industry in Sri Lanka: Benefits and Challenges ¹

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Abstract

Purpose

To achieve the Sustainable Development Goals new thinking is essential. This applies to every country in the world who are signatories to the 2030 Agenda that cuts across all key sectors.

Originality/value (mandatory)

Though sustainable procurement practices is a developing concept in construction industry, it has the potential to enhance the performance of the sustainability aspects of the industry. However, there is minimum methodology to incorporate Sustainable Procurement elements in the construction procurement in many developing countries.

Design/methodology/approach

In the local context, an empirical study that focuses directly on this topic is yet to be carried out. Hence, a study on the sustainable procurement practices in the construction industry is timely and necessary. This study attempts to evaluate the current practices, challenges and benefits to implement the sustainable aspects during the construction procurement. For this purpose, a questionnaire survey was conducted as a mean of collecting data.

Findings

Results of the analysis revealed that “Legislation” as the main driver of implementing sustainable factors in procurement while “Lack of funding” and “un-willingness to incur higher capital cost” ranked as the main barrier for the implementation of sustainable procurement. “Reduction in

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harmful emissions and waste generation” ranked on top as the main benefit of sustainable procurement.

Key words: Sustainable Development Goals, Developing countries, Sustainable procurement, Construction industry

Introduction

In 2002, the United Nations marked a key milestone for sustainable development at the World Summit on Sustainable Development in Johannesburg, South Africa. Of the many pledges, one of the key declarations in the summit was “Improvement in building design and management, better mass transportation, adoption of advanced and innovative cleaner technologies, energy labelling and standards, and better public procurement policies...” (United Nations, 2002). Moreover, it was reinforced that everybody needs to take ownership to strengthen the pillars of sustainable development namely, economic development, social development and environmental protection at all levels, nationally and globally.

The Global Construction Outlook 2020 reveals that the global construction industry is projected to grow from US\$7.4 trillion in 2010 to US\$8.5 trillion in 2015 and to US\$10.3 trillion by 2020 (Reference). The construction industry of countries in an emerging market are forecasted to continue to grow at a much faster rate. According to Construction Intelligence Centre (2016), the construction share will be above 50% from the economy in 2020. (Construction Intelligence Center, 2016). Turner and Townsend (2017) states that “Economists are calling for a significant improvement in productivity to build momentum in global economic growth, but productivity is a persistent issue for the world’s economies and the construction industry in particular which represents 6% of global GDP. The construction sector’s annual productivity improvements averaged 1% over the past two decades, compared with 2.8% for the total world economy and 3.6% for the manufacturing sector” (Turner & Townsend, 2017). Most construction companies commit to investing in productivity improvement for longer-term gains due to steady global economic growth, increasing demand for construction and a shortage of skills and labour, etc.

The Global Construction Outlook 2020 further indicates that 88% of the construction industry is planned to adopt green construction in their projects over the coming years (Reference). 60% has highlighted energy efficiency as the main influencing factor for the implementation of green construction while 77% indicated building design and construction as highly preferred areas for green construction. 69% has stated higher initial cost as the biggest challenge faced by the organization when considering the implementation of green construction projects (Construction Intelligence Center, 2016).

The International Labour Department (ILO) (Year) describes the construction industry as “a sector that produces a wide range of products, from individual houses to major infrastructure such as roads, power plants and petrochemical complexes. In most countries output is roughly equally divided between housing, other buildings and civil engineering projects. Although attention is mostly focused on new construction, the renovation and maintenance of existing structures accounts for almost 50% of total construction output in some of the more developed economies and an even greater share of employment.” Infrastructure constraints limit productivity and access to jobs, markets, healthcare and education while quality infrastructure propels economic growth and social wellbeing (Brauch, 2017). To achieve climate change objectives, infrastructure should be specially designed to mitigate economic, social and environmental risks and to generate economic, social and environmental co-benefits.

In Sri Lanka, the construction sector has contributed to around 5-8% of GDP during the last five years with a gradual increase (Government of Sri Lanka, 2017). This is a relatively low percentage when compared with developed countries. In the survey on construction industries conducted by the Department of Census and Statistics, Ministry of National Policies and Economic Affairs in 2015, 48% of the construction cost has been for the construction of Roads and Railways, 26% for the construction of buildings (residential & non-residential), 9% for utility projects and balance for the other sectors. The report has summarized the use of raw material as 44% for road and railways, 30% for buildings, 9% for utility projects and rest for the other sectors (Department of Census and Statistics, 2015).

The Brundtland Commission's report (Year) defines sustainable development as “development which meets the needs of current generations without compromising the ability of future generations to meet their own needs”. The concept supports strong economic and social development, in particular for people with a low standard of living. At the same time, it underlines the importance of protecting the natural resource base and the environment. Economic and social well-being cannot be improved with measures that destroy the environment. Intergenerational solidarity is also crucial: all development has to take into account its impact on the opportunities for future generations (UNECE, 2017).

The SDGs, officially known as transforming our world: the 2030 Agenda for Sustainable Development, is a set of 17 “Global Goals” (United Nations, 2017). Construction related themes are embedded in almost all the goals and the construction sector can be the leading sector to achieve SDGs. Sustainable construction can be defined as the practice of creating structures and using processes that are environmentally responsible and resource efficient throughout a building's life cycle from siting to design, construction, operation, maintenance, renovation and deconstruction. This practice expands and complements the conventional building design concerns of economy, utility, durability and comfort at the same time enhancing social welfare.

In view of the above, there is a high possibility to address the SDGs through sustainable procurement practices (UNEP, UNOPS, ITC-ILO, 2011).

Buying for a Better world, A guide on Sustainable Procurement for the UN System was published by three UN organisations namely, United Nations Environment Programme (UNEP), United Nations Office for Project Services (UNOPS) and the International Labour Organization (ILO) in 2011. The guidance for sustainable procurement has been documented in the publication. The opening remarks of the book state that “Sustainable Development requires a well-balanced relationship between lasting human development and the sustainable use of planet resources” (UNEP, UNOPS, ITC-ILO, 2011).

(Nepal, 2015) has done a study on comparison of Whole Life Cost (WLC) of construction materials in conventional vs. sustainable public facilities in Nepal in 2015. The features of sustainable building have been defined as, passive solar design, lighting, water Management and waste management. Since the new construction and renovation requires many materials, this is an opportunity to utilize the products that enhance the sustainability of the buildings. These products may be made of the recycled content, sustainably grown and harvested wood and pulp materials, products that have low emissions, and products that are sourced locally. These products enhance the sustainability of the buildings by supporting local economies and reducing the fuel needed to transport them long distances (Brauch, 2017).

The report published by International Institute of Sustainable Development (Year) had deeply discussed the importance of sustainable development. Further, Australian Government: Department of Sustainability, environment, Water, population and communities (2013) (Australian Government : Department of Sustainability, environment, Water, population and communities., 2013) has published a guideline on Sustainable Procurement. (Opoku & Fortune, 2011) Opoku & Fortune (2011) have discussed the effect of leadership in construction organizations and the promotion of sustainable practices for innovation in Building Construction. (Mensah & Ameyaw, 2012) have done a study on Sustainable Procurement highlighting the challenges of practice in the construction industry in Ghana. (Wong, Chan, & Wadu, 2015) study on factors that are important in enhancing green procurement in the construction process in Hong Kong and discusses mandatory environmental regulations by the government, client requirements in tendering, and government and non-governmental organization requirements as the top three significant factors.

(Sourni & Sohail, 2011) have identified challenges and obstacles regarding public procurement in the United Kingdom. The aim of their study was to develop a theoretical framework to assist public clients in addressing sustainable construction in procurement. (Ruparathna & Hewage, 2013) have discussed the challenges and benefits in sustainable procurement in Canada. A mixed

research method including qualitative and quantitative techniques was administered through a questionnaire survey with semi structured interviews. The authors have referred to the benefits identified by (Sourni & Sohail, 2011) and benefits as summarized following (ASOSAI, 2006). (Ofori & Toor, 2008) have widely discussed the leadership requirement for sustainable construction - “Leaders should embed sustainability in their organizational activities and make sustainable development part of their overall business strategy”. Role of Sustainability leaders has been defined as, “helping to promote sustainable construction through training staff on sustainability; produce guidance notes and policies; ensure that sustainability is embedded in the business; sustainability monitoring and appraisal etc.” (Opoku & Fortune, 2011).

Reliable studies on this important topic in Sri Lanka is limited. However, there are few important studies, which deal with sustainable procurement. (Ruparathna & Hewage, 2015) have conducted a study on current practices in Sri Lanka, drivers and opportunities of sustainable procurement in the Canadian construction industry is notable. Apart from an initial desk review, the research was administered through a mixed method approach that consisted of semi structured questions in the survey. The main responsibility of managing the procurement process is assumed as the responsibility of the project owner, representative or an authorized external party (Ruparathne & Hewage, 2015).

(Mohan, 2010) Mohan’s (2010) study on Public Procurement for Sustainable Development in Sri Lanka aims to; i) review the range of targeted procurement procedures; ii) review and asses the current Sri Lankan government procurement arrangements; iii) identify constraints to the target procurement system and iv) identify what needs to be done in the longer term. (Rameezdeen & Silva, 2002) have discussed the change of procurement trends in the construction industry of Sri Lanka specially focusing on the building subsector. Written structured questionnaire survey and unstructured interviews among professionals was used as information collecting methods. 73% of the total population of M1 & M2 contractors has participated for the questionnaire. Construction procurement is defined as the organizational structure adapted to by the client for the management of design and construction of a project (Rameezdeen & Silva, 2002). Construction procurement systems are categorized into four broader classifications as, separated system, integrated system, management-oriented systems and collaborative system.

Unfortunately, there is a dearth of research on sustainable procurement practices in the construction sector of Sri Lanka. Therefore, the intention of this research is to find a solution to fill the knowledge gap in sustainable procurement by weighing the benefits and challenges of sustainable procurement practices in Sri Lanka.

Objectives

The overall objective of this research is to identify and evaluate the challenges and benefits to incorporate sustainable procurement practices in the construction industry of Sri Lanka.

The specific objectives are to;

1. Review the current procurement practice in the construction industry;
2. Identify and evaluate the challenges to implement sustainable procurement processes and procedures;
3. Analyse the benefits of sustainable procurements;

Research Methodology

The research was mainly targeted at the Government, semi government and private sector officials in the construction industry in Sri Lanka and the personnel from international organizations such as the United Nations (UN), World bank (WB), Japan International Cooperation Agency (JICA) and Asian Development bank (ADB).

A comprehensive desk review, a literature review and a questionnaire survey was conducted as data collection methods.

In order to achieve the above objectives, the following steps were followed:

- **Desk Review:** Conducted a review of the procurement manuals and guidelines published by NPA (National Procurement Agency) of Sri Lanka, CIDA (Construction Industry Development Authority) , WB (World Bank) and UNOPS (United Nations Office for Project Services) to identify the current practice.
- **Literature Review:** Undertook a detailed literature review to assess the current research related to the objective of the research. It also provided an overview of the kind of information available at present and existing data and process gaps.
- **Questionnaire Survey:** Administered a survey among selected entities in Sri Lanka, which included, public institutions, private construction organizations, semi government and international institutions such as UNOPS, ADB, JICA and WB. An assessment of educational background and related developments of the procurement officials were also covered in the survey. The questionnaire was inclusive of five sections as follows.
 1. Introduction and company name (Optional)
 2. Procurement personnel information
 3. Background information of the institution
 4. Procurement procedures of the institution

5. Sustainability initiatives.

Results

Respondents to the Survey

The analysis was conducted based on 52 responses. Out of which 48% of the respondents who took part in the survey were from the private sector, while 29% were from the Public/ Semi government sector and 23% were from international organizations/ Non-Governmental Organizations (NGOs). Further, out of the respondents, 40% of them were in between 40~49 years of age while 33% of the respondents were in the 30~39 age group. Out of those who had responded, 50% held postgraduate qualifications. Due to the variety of the respondents who took part, a good combination of data was received on the areas of the construction sector they work in.

As shown in Figure 1, more than 92% have been involved in building construction activities, while 61.5% of respondents have been involved in the water supply and sanitation sector and 59.6% involved in highway construction.

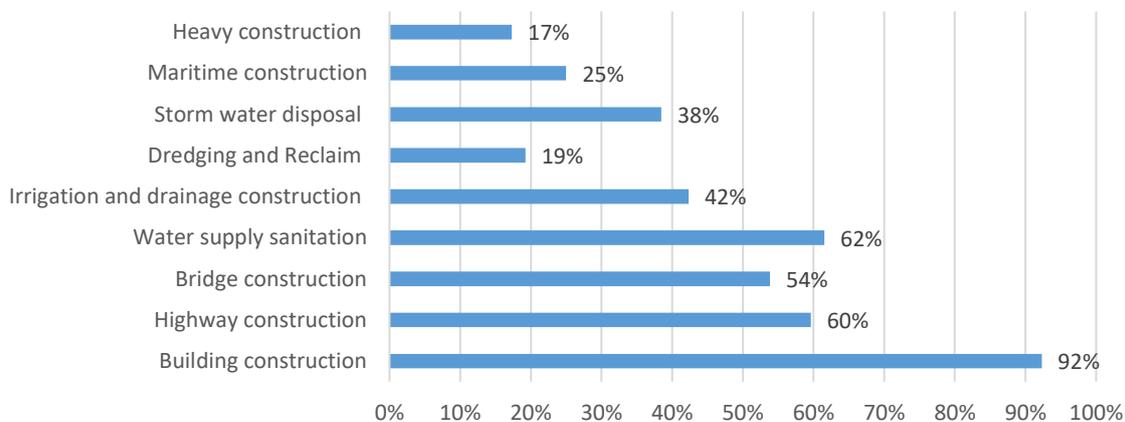


Figure 1: Response by Engineering Speciality of the institution

As the respondent demographics were widely representative of the procurement community in the industry, this provided a good sample to assess the industry practice and understanding.

Data analysis was conducted by using SPSS software, Microsoft Excel and the facility available through Google Forms. Considerations were given to assess the sample representation by considering many other aspects, which include cross analysis by different parameters as listed below:

- 1) Using all data
- 2) Age group (below 30 , 30 ~39, 40~49, 50 and above)
- 3) Educational level (certificate, diploma, undergraduate & postgraduate)
- 4) Sector representing (public, private and international organization/NGO)
- 5) Procurement experience (0 ~5 , 6~10, 11~15, 16~20 & over 20 years)
- 6) International experience (0 ~5 , 6~10, 11~15, 16~20 & no international experience)

As a result of the quantitative analysis, following factors were identified as the main drivers for sustainable procurement: Legislation (Government and regulations); Company willingness to change; Client procurement policy; and, the Competitive edge of the market.

Table 1 : Analysis of main drivers for sustainable procurement

Main drives	No of Responses	Mean	Std. Deviation	Rank
Legislation (Government and regulations)	52	4.212	0.605	1
Company willingness to change	52	4.096	0.634	2
Client Procurement Policy	52	4.077	0.652	3
Competitive edge of the market	52	4.019	0.610	4

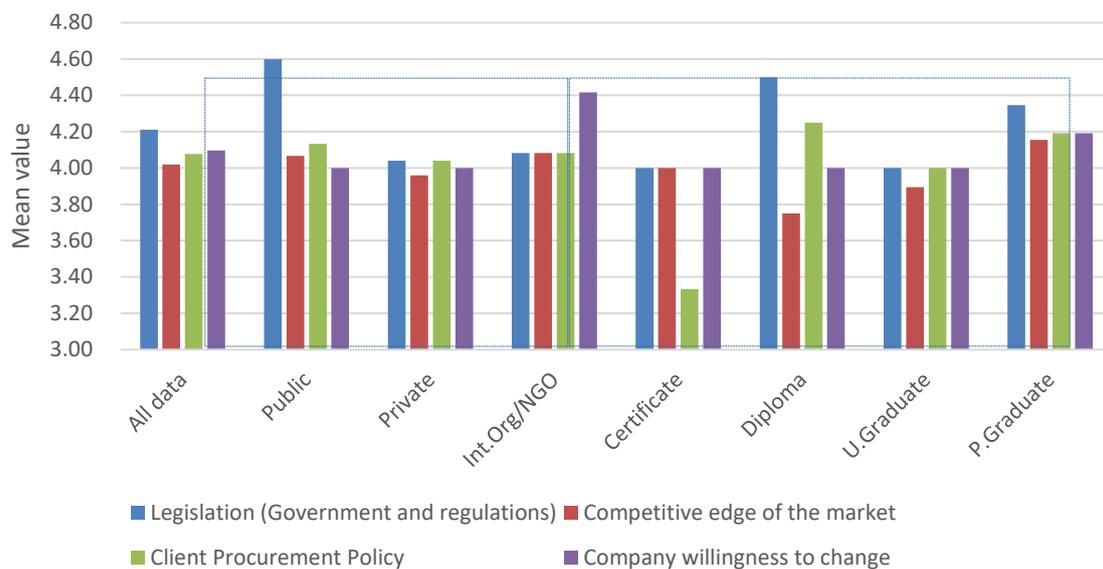


Figure 2: Responses to main drivers by all data, by sector and education level

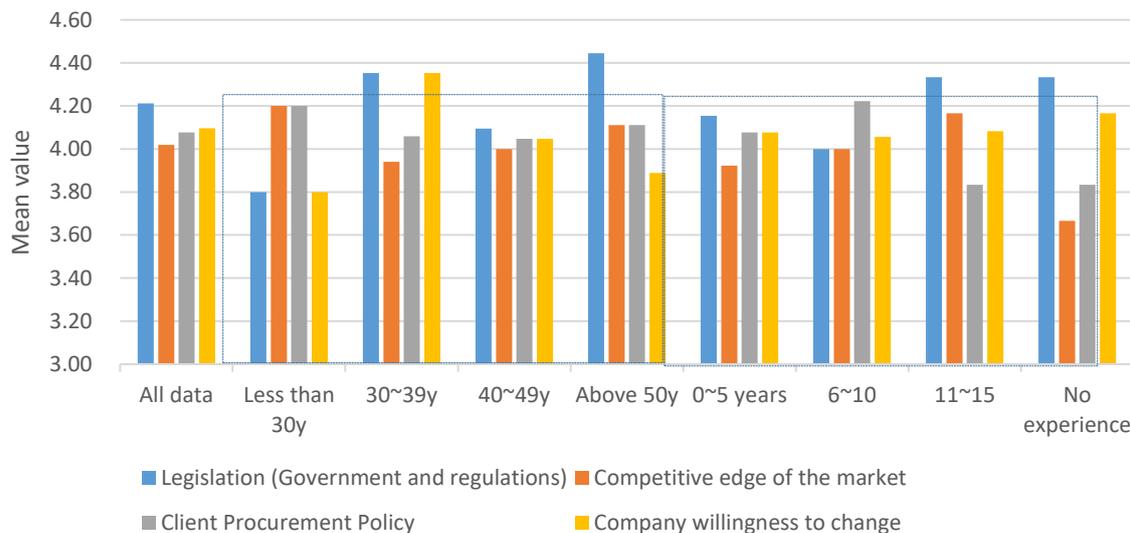


Figure 3: Responses to main drivers by all, by age and by Procurement Experience

While this order is similar across different factors such as education and level of experience, clear differences can be seen based on the sector the respondents work in. Those in the public sector have rated “Legislation” as the main driver for sustainable procurement while the International organization/ NGO has ranked “Company willingness to change” as the main driver; private sector has rated all the factors in similar weightage. The results show a clear difference in the thinking pattern of those working in the respective sectors and how their line of work and exposure as well

the perspective they have, change their interpretation and understanding of how sustainable procurement needs to be implemented. Public sector employees see it as a need to be enforced through regulation while private sector sees it being tied into their business requirements. International Organization/ NGO employees see it as a change process that on the outset needs to be adopted from within the organization, with all other factors also contributing to help ensure its implementation. Procurement officials in international organizations/NGO had also shared a wide range of ideas on how sustainable procurement can be implemented.

As seen in Figure 3, there is a considerable deviation of results with the age group. All age ranges excluding the age below 30 years have voted the “Legislation” as the main driver while “competitive edge of the market & Client procurement policy” has top-ranked with the age below 30 years. Voting pattern with procurement experience is somewhat similar.

Variation of ranking by secondary factors such as education level, age, sector, Procurement experience and international experience is tabulated below in Table 2.

Table 2 : Ranking of benefits by secondary factors

#	Cross Analysis Category	All Data	Analysis by Education level				Analysis by Age				Analysis by Sector			Analysis by Procurement Experience					Analysis by International Proc Experience			
			Certificate	Diploma	Graduate	P-Graduate	Below 30	30~39	40~49	above 50	Public	Private	Int/NGO	0~5	6~10	11~15	16~20	over 20	0~5	6~10	11~15	No Exp
1	Legislation (Government and regulations)	1	1	1	1	1	3	2	1	1	1	2	2	1	3	1	1	1	2	1	2	1
2	Company willingness to change	2	1	3	2	2	3	1	2	4	4	3	1	2	2	3	2	4	3	3	2	2
3	Client Procurement Policy	3	4	2	2	3	1	3	2	2	2	1	2	2	1	4	3	2	4	1	1	3
4	Competitive edge of the market	4	1	4	4	4	1	4	4	2	3	4	2	4	3	2	4	2	1	3	2	4

As listed in Table 3, the analysis showed that respondents identified 1) Lack of funding and unwillingness to incur higher capital cost; 2) insufficient policies, regulations, incentives and lack of leadership; and 3) Lack of awareness, understanding, information, commitment and demand as the three main challenges for sustainable procurement.

Table 3 : Analysis of challenges

Challenges	No of Response	Mean	Std. Deviation	Rank
Lack of funding and un-willingness to incur the higher capital cost	52	4.096	0.823	1
Insufficient policies, regulations, incentives and lack of leadership	52	4.019	0.828	2
Lack of awareness, understanding, information, commitment and demand	52	4.000	0.767	3
Resistance to change	52	3.981	0.779	4
Separation between capital budget and operational budget	52	3.769	0.731	5
Complicated procedures	52	3.712	0.957	6
Insufficient skilled staff for execution	52	3.654	0.988	7
Insufficient/confusing guidance, tools, demonstrations and best practice	52	3.635	0.929	8
Lack of sufficient time to address sustainability issues	52	3.558	0.998	9
Vagueness of definitions and diversity of interpretations	52	3.500	0.828	10

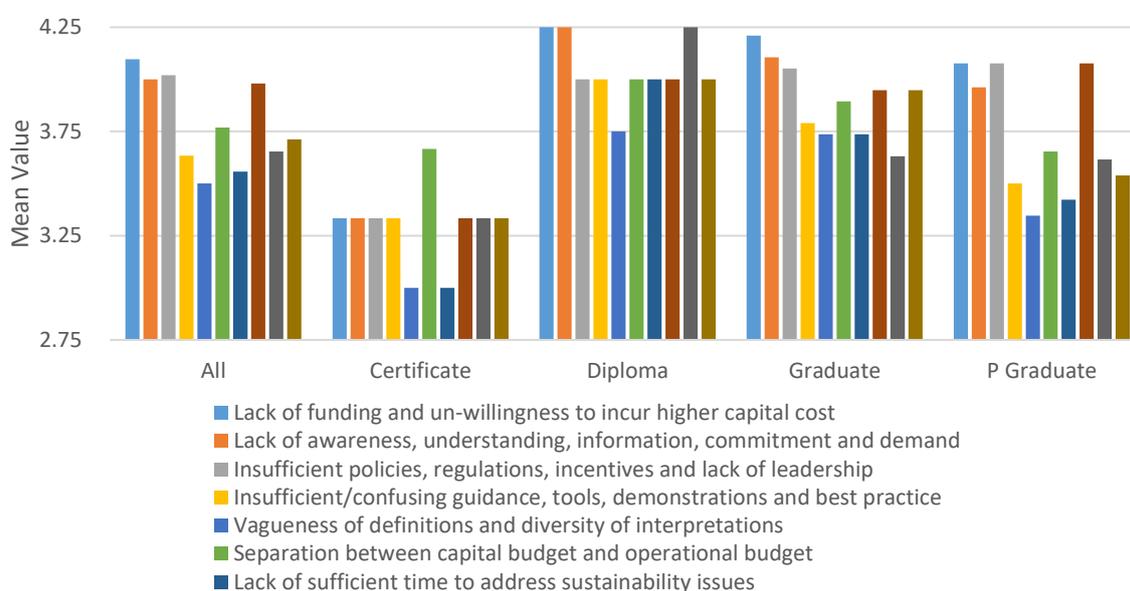


Figure 4 : Analysis of data on Challenges by all data & by education level

The results through cross analysis is also similar in most of the areas. However, the people having post-graduate education level and people having more procurement experience (over 15 years)

have given broader answers and it highlights that the thinking pattern and ability to grasp the concept of implementing sustainable procurements is higher among respondents who have postgraduate qualifications and having more than 15 years of procurement experience. This would most likely be due to the exposure to international experiences or new education areas or global best practices.

Variation of ranking by secondary factors such as education level, age, sector, procurement experience and international experience is tabulated below in

Table 4.

Table 4 : Ranking of Challenges by secondary factors

Cross Analysis Category	All Data	Analysis by Education level				Analysis by Age				Analysis by Sector			Analysis by Procurement Experience				Analysis by International Proc Experience				
		Certificate	Diploma	Graduate	P. Graduate	Below 30	30~39	40~49	above 50	Public	Private	Int/NGO	0~5	6~10	11~15	16~20	over 20	0~5	6~10	11~15	No Exp
Lack of funding and un-willingness to incur higher capital cost	1	2	1	1	1	1	2	2	1	1	1	4	4	1	7	1	1	1	1	3	2
Insufficient policies, regulations, incentives and lack of leadership	2	2	4	3	3	4	2	3	3	2	3	2	2	2	5	2	1	3	1	1	3
Lack of awareness, understanding, information, commitment and demand	3	2	1	2	4	1	4	1	5	4	4	1	1	6	2	3	1	6	5	3	1
Resistance to change	4	2	4	4	1	1	1	4	8	3	2	3	3	4	1	3	4	1	3	8	4
Separation between capital budget and operational budget	5	1	4	6	5	6	7	6	3	5	5	7	6	4	6	6	7	5	5	1	5
Complicated procedures	6	2	4	4	7	9	5	5	9	5	8	6	7	3	3	10	9	6	5	6	6
Insufficient skilled staff for execution	7	2	1	10	6	5	6	10	9	7	6	8	5	8	3	8	10	4	3	10	7
Insufficient/confusing guidance, tools, demonstrations and best practice	8	2	4	7	8	6	9	7	2	9	7	4	7	9	9	3	7	9	5	6	8
Lack of sufficient time to address sustainability issues	9	9	4	9	9	10	8	7	6	7	9	10	10	7	7	6	4	8	5	9	9
Vagueness of definitions and diversity of interpretations	10	9	10	8	10	8	10	9	6	10	10	9	9	10	10	8	4	10	10	3	10

The analysis showed that respondents felt that reducing harmful emissions and waste generation; improving in working conditions - labour standards, health and safety; and reducing use of natural resources were the primary benefits of using sustainable procurement.

Table 5 : Analysis of Benefits

Benefit	N	Mean	Std. Deviation	Rank
Reducing in harmful emissions and waste generation	52	4.308	0.506	1
Improving in working conditions - labor standards, health and safety	52	4.269	0.598	2
Reducing use of natural resources	52	4.250	0.556	3
Saving the long term by considering the whole life cycle cost	52	4.192	0.561	4
Stimulate the market for green technologies	52	4.135	0.595	5
Improving the efficiency and transparency of procurement procedures	52	4.096	0.664	6
Up skilling your workforce to meet the future needs of your organization	52	4.000	0.594	7
Meet international obligations (Kyoto protocol/Climate Change-UNFCCC)	52	3.885	0.758	8
Assisting disadvantaged groups in society	52	3.712	0.723	9

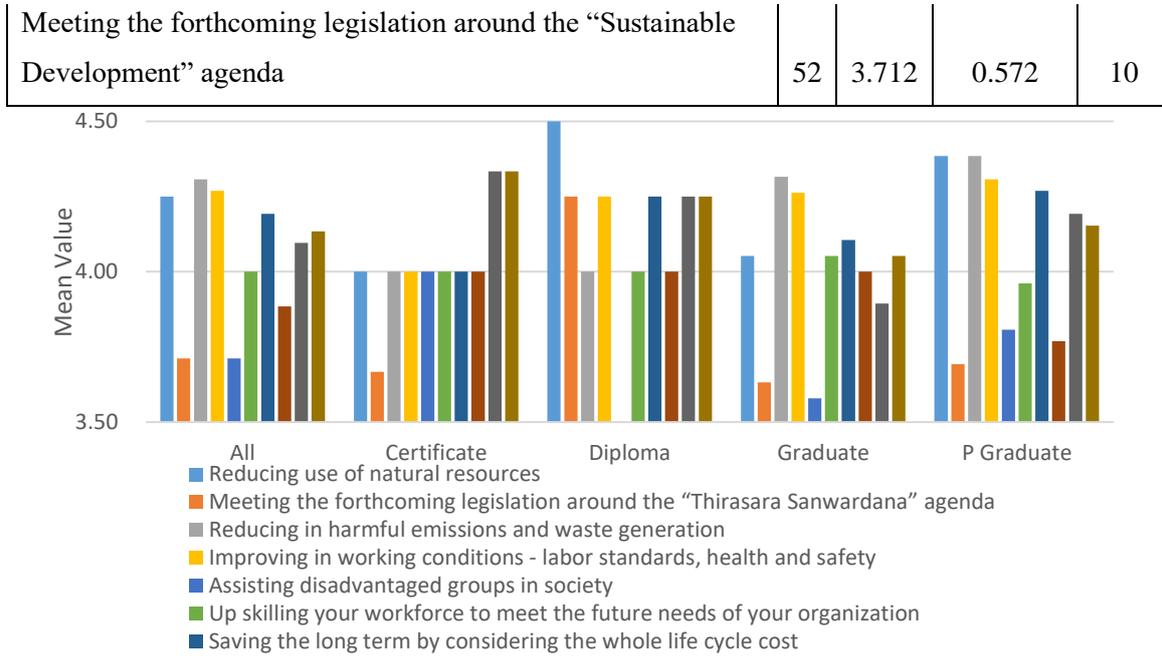


Figure 5 : Analysis by all data & by Education level

The results of cross analysis revealed diverse results by different category. The perceptions of staff who have graduate/ post graduate qualifications are quite similar with those aged above 40 years, as well as those with more than 15 years of procurement experience and those having international experience. There is also a clear difference in the benefits that people working in the international organizations/ NGOs see than those in the public and private sectors, who have somewhat of a similar view point.

Variation of ranking by secondary factors such as education level, age, sector, procurement experience and international experience is tabulated below in Table 6.

Table 6: Ranking of Benefits by secondary factors

Cross Analysis Category	# Factor / Sub Criteria	All Data	Analysis by Education level			Analysis by Age				Analysis by Sector			Analysis by Procurement Experience					Analysis by International Proc Experience				
			Certificate	Diploma	Graduate	P. Graduate	Below 30	30~39	40~49	above 50	Public	Private	Int/NGO	0~5	6~10	11~15	16~20	over 20	0~5	6~10	11~15	No Exp
1	Reducing in harmful emissions and waste generation	1	3	7	1	1	4	1	2	2	1	2	6	1	3	3	1	1	4	1	2	1
2	Improving in working conditions - labor standards, health and safety	2	3	2	2	3	1	2	4	6	2	3	2	2	2	4	1	4	1	3	2	2
3	Reducing use of natural resources	3	3	1	4	1	8	3	1	8	3	1	5	7	1	2	5	1	2	1	2	3
4	Saving the long term by considering the whole life cycle cost	4	3	2	3	4	1	4	3	6	3	4	2	4	6	1	5	4	2	3	2	4
5	Stimulate the market for green technologies	5	1	2	4	6	4	6	5	2	6	4	4	5	4	5	1	8	4	3	8	5
6	Improving the efficiency and transparency of procurement procedures	6	1	2	8	5	3	9	6	1	8	6	1	6	7	5	1	4	6	3	1	6
7	Up skilling your workforce to meet the future needs of your organization	7	3	7	4	7	4	6	7	2	5	7	8	8	4	7	7	8	7	3	2	8
8	Meet international obligations (Kyoto protocol/Climate Change-UNFCCC)	8	3	7	7	9	4	4	9	5	7	8	8	2	9	9	10	8	8	10	8	6
9	Assisting disadvantaged groups in society	9	3	10	10	8	10	6	10	8	10	10	7	10	8	8	7	1	8	9	2	10
10	Meeting the forthcoming legislation around the "Thirasara Sanwardana" a	10	10	2	9	10	9	10	8	10	9	9	10	9	10	10	9	4	10	3	10	9

Social Factors

The top three social factors that can be considered during procuring construction contracts were identified as: Health and Safety of the workforce; Welfare facilities to work force and Fair and reasonable wages to the workers.

Table 7: Analysis of Social factors

Social factors	No. of Responses	Mean	Std. Deviation	Rank
Health and Safety of the workforce	52	4.62	.491	1
Welfare facilities to workforce	52	4.38	.530	2
Fair and reasonable wage to the workers	52	4.35	.556	3
Capacity building of work force /knowledge transfer	52	4.33	.585	4
Reduce impact on surrounding environment	52	4.29	.605	5
Use of local labour	52	4.08	.813	6
Use of Department of Labour/ILO as minimum guidelines	52	4.04	.559	7
Social awareness and community consultation	52	4.02	.577	8
Past performance of the contractor related to social factors	52	4.00	.686	9
Gender equality	52	3.44	1.037	10

Feedback among most of the cross analysis has a similar range of priorities and there was a consensus among all the respondent categories that health and safety of the workforce as being

the main social factor for sustainable procurement. Interestingly, almost all the categories also put gender equality as the bottom-most factor for sustainable procurement. Gender equality is the main consideration in developed countries and international organizations.

Variation of ranking by secondary factors such as education level, age, sector, Procurement experience and international experience is tabulated below in

Table 8.

Table 8: Ranking of Social Factors by secondary factors

#	Cross Analysis Category Factor / Sub Criteria	All Data	Analysis by Education level				Analysis by Age				Analysis by Sector			Analysis by Procurement Experience					Analysis by International Proc Experience			
			Certificate	Diploma	Graduate	P. Graduate	Below 30	30~39	40~49	above 50	Public	Private	Int/NGO	0~5	6~10	11~15	16~20	over 20	0~5	6~10	11~15	No Exp
1	Health and Safety to woke force	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
2	Welfare facilities to work force	2	1	3	2	2	4	4	2	2	2	3	3	4	2	2	1	2	6	4	2	
3	Fair and reasonable wage to the workers	3	1	3	2	4	3	5	3	2	4	4	2	2	5	2	7	4	3	6	2	3
4	Capacity building of work force /knowledge transfer	4	7	3	2	3	1	3	6	4	5	3	5	4	2	5	2	1	4	1	2	5
5	Reduce impact on surrounding environment	5	1	3	5	5	7	2	4	4	2	6	5	6	3	4	2	4	5	3	6	4
6	Use of local labour	6	1	1	6	7	4	7	6	10	8	5	8	5	5	9	7	10	6	9	9	7
7	Use of Department of Labour/ILO as minimum guidelines	7	7	3	9	6	7	8	5	9	9	7	8	8	7	7	2	8	8	3	6	8
8	Social awareness and community consultation	8	7	3	7	9	9	6	8	8	6	9	5	9	8	6	2	8	7	3	6	9
9	Past performance of the contractor related to social factors	9	1	9	8	8	6	9	9	4	7	8	4	7	9	7	7	4	9	6	4	6
10	Gender equality	10	7	9	10	10	10	10	10	7	10	10	10	10	10	10	4	10	10	9	10	

Environmental Factors

The top three environmental factors to be considered during procuring construction contracts as identified by the respondents were: Increase of water efficiency; Increase of Energy efficiency and Use of renewable energy.

Table 9 : Analysis of Environmental factors

Environmental factors	No of Responses	Mean	Std. Deviation	Rank
Increase of water efficiency	52	4.538	0.503	1
Increase of Energy efficiency	52	4.385	0.599	2
Use of renewable energy	52	4.365	0.687	3
Reduction of air pollution	52	4.346	0.653	4
Reduction of greenhouse gas emission	52	4.173	0.648	5
Rain water harvesting	52	3.904	0.975	6
Use of Biodegradable or Compostable materials	52	3.865	0.841	7
Comply with LEED	52	3.635	0.817	8
Comply with GBCSL	52	3.635	0.768	9
Implement buy back option	52	3.423	0.936	10

Feedback among most of the cross analysis has a similar range of priorities. However, it was interesting to note that staff who have more than 6 years of international experience showed a

broader understanding and viewpoints about environmental sustainable factors related to procurement.

Important environmental factors such as buyback option and use of biodegradable or Compostable materials has taken lower rank in the survey. This is most likely due to the current market practice of non-availability or un-affordable price of such materials. The factor like buy back option in the last rank shows the unawareness of environment impact during disposal of items. Items like batteries, air conditioners, refrigerators, asbestos roofing sheets, etc need proper disposal. Buyback option through vendors can be a good solution for proper disposal of the goods with minimal impact to the environment.

Variation of ranking by secondary factors such as education level, age, sector, procurement experience and international experience is tabulated below in Table 10.

Table 10 : Ranking of Social Factors by secondary factors

#	Cross Analysis Category Factor / Sub Category	All Data	Analysis by Education level				Analysis by Age				Analysis by Sector			Analysis by Procurement Experience					Analysis by International Proc Experience			
			Certificate	Diploma	Graduate	P. Graduate	Below 30	30~39	40~49	above 50	Public	Private	Int/NGO	0~5	6~10	11~15	16~20	over 20	0~5	6~10	11~15	No Exp
1	Increase of water efficiency	1	4	2	1	1	1	1	2	1	1	3	2	1	1	2	1	1	1	1	1	1
2	Increase of Energy efficiency	2	4	1	2	4	2	4	2	2	3	2	3	5	2	2	2	3	3	1	1	3
3	Use of renewable energy	3	1	2	3	3	5	2	4	1	2	4	2	3	4	3	2	1	2	1	1	4
4	Reduction of air pollution	4	1	4	4	2	2	3	3	6	4	3	5	1	3	5	1	6	6	4	6	2
5	Reduction of greenhouse gas emission	5	4	5	5	5	2	5	5	8	5	5	1	4	5	4	5	3	4	4	4	5
6	Rain water harvesting	6	1	5	6	7	8	6	6	5	7	6	6	7	6	5	6	10	4	8	8	6
7	Use of Biodegradable or Compostable materials	7	4	9	7	6	6	7	7	2	5	9	7	6	9	7	8	6	7	8	6	7
8	Comply with LEED	8	8	7	8	9	10	9	9	7	9	7	8	9	8	8	8	3	10	6	4	9
9	Comply with GBCSL	9	8	7	9	8	8	8	8	10	8	8	10	8	7	9	8	6	8	6	8	8
10	Implement buy back option	10	8	9	10	10	7	10	10	9	10	10	8	9	10	10	6	9	9	8	8	10

Conclusions

The study was conducted to evaluate the current sustainable procurement practices while identifying challenges and benefits of implementing sustainable procurement practices in the Sri Lankan construction industry. Sustainable procurement in the construction industry appears to be in the starting blocks in terms of research and available material, especially in the Sri Lankan context. However, the importance of sustainability is underscored in the fact that construction related themes are embedded in almost all 17 SDGs and as such the construction sector can be the leading sector to achieve 2030 Agenda. A majority of prior scholarly publications related to sustainable construction procurement have been centered on environmental criteria. This can be

improved by incorporating social, and economic consequences of design; manufacturing and production methods; non-renewable material use; logistics; recycling options; operations; maintenance; reuse; suppliers' capabilities; and service delivery and disposal. In order to achieve sustainability in infrastructure or the built environment of society, a good collaboration between designers/engineers and procurement practitioners are necessary. This can be executed through proper planning and the establishment of an effective coordinating mechanism between these functions.

Legislation has been determined as the main driver for sustainable procurement while company willingness to change is in second place. This order is similar across different factors such as education level and experience. Clear difference can be seen based on sector representation. Those who represent public sector has ranked legislation as number one and those who represent international organizations has ranked company willingness as main driver for sustainable procurement. Government of Sri Lanka, NPA, CIDA and the Institution of Engineers Sri Lanka (IESL) can be attributed to develop and implement the standards and regulations. Lack of funding and un-willingness to incur higher capital cost, insufficient policies, regulations, incentives and lack of leadership and lack of awareness, understanding, information, commitment and demand has listed as top three challenges for sustainable procurement.

The people having post graduate education level and having more procurement experience (over 15 years) have given broader answers. Reducing harmful emissions and waste generation, improving in working conditions - labour standards, health and safety and reducing use of natural resources were identified as top three benefits of using sustainable procurement. There is a clear difference in the ranking of benefits that people working in the international organizations/ NGOs than those are in the public and private sectors, who have somewhat of a similar view point. Health and Safety of the work force, welfare facilities to work force and fair and reasonable wages to the workers have been listed as top three social benefits. Increase of water efficiency, Increase of Energy efficiency and use of renewable energy have been listed as top three social factors.

Respondents who have more than 6 years of international experience showed a broader understanding and viewpoints about social factors. Increase of water efficiency; Increase of Energy efficiency and; Use of renewable energy has been listed as top three environmental factors. Procurement guidelines and manuals that are available locally lack proper sustainability elements related to infrastructure procurements. Some of the international organizations have separate chapters for sustainable procurement. There is a minimal or zero use of sustainable procurement elements in the reviewed solicitation documents. The study revealed that current procurement practices are been carried out with few major concerns such as, lack of knowledge, lack of resources and insufficient training opportunities related to sustainability. The lack of published

sustainable procurement guidelines and government regulations also contribute to the current situation of the sustainability initiatives.

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