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Projection of Construction Resources

Abstract

Accelerating economic growth needs a significant up scaling of investment and improving overall productivity level. Accordingly, Investment/GDP Ratio is expected to increase to a level of 32 to 38 percent during the next ten years. The National Savings which are currently at a level of about 25 percent of GDP is also expected to improve in parallel with growing incomes. However, there will be a continuing Investment-Savings gap to be financed from external sources, in the form of both official and private foreign capital inflows. Reflecting the increased utilization of foreign resources for major infrastructure projects, the current account deficit will be in the region of 3.5 to 4.5 percent of GDP during the next three years. This ratio is predicted to decline thereafter to around 3.0 percent of GDP. With the growth in export earnings and higher economic growth the external debt indicators are expected to improve over the medium-term.

All three major sectors - Agriculture, Industry and Services are expected to grow at rates faster than those observed during the last five-year period. The targeted average growth rate during 2006 - 2016 is 4-5 percent in Agriculture, Forestry and Fishing. Industry in which include Mining, Quarrying, Manufacturing, Construction, Electricity, Gas and Water, growth rate of 8-9 percent is expected while the Services sector is projected to grow by 9-10 percent.

The construction industry has expanded strongly – if not unevenly – over the past seven years, with annual growth averaging 19.1% between 2011 and 2016, according to figures from the Central Bank of Sri Lanka (CBSL). Rates have slowed since the boom years earlier in the decade: in 2011 the sector grew by 34.3%, followed by a 37.5% increase in 2012. This moderated to 15.2% in 2013 and 13.7% in 2014, dropping to 1.8% in 2015. However, 2016 saw growth pick up again to 12.5%, taking the sector's total contribution to GDP to LKR923bn (\$6bn), while the first three quarters of 2017 brought in LKR773.5bn (\$5.1bn), equal to 8% of year-to-date GDP.

In order to sustain this massive immerging growth of the Construction Industry it is to be ensured that resource requirement of the Construction Industry are adequately met. The meeting of the increased requirement of the industry in a sustainable manner creating minimum impact on environment is becoming increasingly difficult due to the ever increasing demand and resource requirement of the industry must be made available.

The excessive use of natural resources more than the rate of the regeneration may cause additional stresses on the ecological systems leading to threatening of their existence. This situation urges that innovative approaches are urgently required to meet these emerging demands in the Construction Industry in a sustainable manner.

1.0 Background

Sri Lanka is an island country located approximately 32km away south easterly of India and at the tip of the Asian Continent, with a land area of 65,610 square km (sq.km). In 2013, the country had an estimated population of 20,483 million with an annual growth rate of 1 per cent. Since its independence in 1948, Sri Lanka had remained unstable politically and socially because of a long civil war and terrorism between the majority group of Sinhalese (75%) and the minority group of Tamil (15.4% Sri Lankan & Indian Tamil) until the 25-year-long domestic strife ended in May 2009.

In the early years of this decade, Sri Lanka was still experiencing a post-war boom, led by government and international construction efforts. However, the country experienced a financial sector correction in 2012, which may have had an impact on investor confidence. This was followed by a sharp slowdown in 2015 that can partially be attributed to political uncertainty during a double election year, which resulted in an unexpected victory for the opposition and an untested new coalition. The current administration has committed to addressing Sri Lanka's precarious budgetary position through fiscal consolidation, and reappraising the previous administration's ambitious infrastructure projects.

The administration garnered high regard from investors and international partners for its determination to strengthen Sri Lanka's macroeconomic fundamentals by reining in debt and reducing the budget deficit, which topped 7% in 2015. Both factors had threatened to undermine economic stability and the country's recent post-war success. The \$1.5bn three-year deal signed with the IMF in April 2016 further bolstered confidence and reform efforts, and after analyzing contract terms and economic rationale, the government decided to continue with a range of big-ticket projects, including Port City Colombo, Hambantota Port and various new motorways.

There are several massive projects which can generate a huge number of opportunities for the local construction industry.

Science & Technology City, Horana Industrial Township, Mirigama Industrial Township, Logistic Corridor, Aero City Project, Avissawella Plantation City, Forest City Baduraliya, Tourism Corridor, 09 Projects by UDA, Water Supply Projects, Waste Water/ Sewage Treatment Plant Projects, Energy Sector Projects, Expressways, highways & bridges, Colombo – Katunayake Expressway (25km), Southern Expressway part 2 Galle to Matara, Outer Circular Highway (28km), Colombo – Kandy Highway (98km), North Central Province Roads, Puttalam Anuradhapura Road, Katunayake – Peradeniya – Anuradhapura (153.3km) Highways, Water supply & drainage, Jaffna Peninsula Water Supply & Sanitation, Ruhunupura Water Supply Development, Alawwa – Polgahawela Integrated Water Supply Project, Wanadurupeeny Ella Water Supply Project, Kalu Ganga Water Supply Project Phase I Stage II & Non Revenue Water Reduction in Colombo City, Greater Kandy WS – Phase I Stage II.

In the construction industry, it is imperative to satisfy several key factors such as incorporating high quality raw material, cutting edge technology, skilled labour and a proper regulatory body, to constantly maintain highest quality and standard. Certain factions, engaged in importing and selling substandard cement, have ruined the faith placed by consumers. This has been further affected by the flaws found in standardization process of cement.

Cement, sand, metals and steel are key materials used in the construction sector. Even though the construction sector utilize several other materials, these four elements - cement, metals sand and steel that are used for producing concrete - solely ensure the strength and durability of a building.

Development Plans in Construction Sector

The construction industry of a country will play an important role in the economic growth of that country being an industry that is large, dynamic and complex. This is true for a country like Sri Lanka as well. In the construction sector, a project will be considered as a success if it has met the goals and objectives stated in its project plan and if it has attained the expected technical performance by completing the work on schedule within the budgetary allocations provided. Among all project parameters, cost has become the most important, being the prime factor contributing to the success of a project. Most of the construction projects in Sri Lanka incur cost overruns. Therefore, the ability to minimize the cost of a project could determine its profitability and even the very survival of the company undertaking the project.

The Central Environment Authority (CEA) and the Geological survey and Mines Bureau (GSMB) of Sri Lanka are the two government bodies in charge of environmental policies and regulations in the Construction industry. While the CEA is responsible for providing the environmental clearance for any construction project, both organizations together decide the licensing and certification process for the extraction of construction materials: metals (ore), sand, other minerals and timber. The National Environment Act and the amendments on the Environmental Impact Assessments (EIA) specify the guidelines for construction projects in obtaining environmental clearance. It also specifies the organizations that have the authority to approve ELA's in Sri Lanka.

All licenses to extract geological resources need to be regularly renewed. Once the permit is given, it needs to be closely monitored, to guarantee that the process is environmentally compliant.

1.1 Construction Resources

The industry is also facing a challenge in obtaining adequate main construction elements like sand, metal and cement. As a result continuously providing high quality results is being questioned. The need to use alternate substitutes with the support of technology is essential in order to cater the prevailing construction boom. The growing demand for sustainability is also one of the main impediments the industry is facing right now.

Cement

Out of the above mentioned elements, cement is the only material produced inside a factory under special quality controlled means. Only a cement manufacturing company, who has a 100% local manufacturing facility with fully integrated plant, can maintain consistent quality and standard throughout the process of cement production.

This consistent quality cement will lay a strong footing to local construction industry. If standardization techniques can be further developed parallel to the growth of the local construction sector, consumers will be able to buy the finest quality cement. It is essential to spread awareness amongst those involved in the construction sector and the general public of the importance of using high quality cement instead of importing and distributing low-priced substandard cement.

Sand

Finding high quality pristine sand is one of the biggest challenges faced by the industry. This type of sand is not only rare but is also priced highly. One of the main reasons for the high price is the

lack of resources as opposed to the escalating demands. Moreover, after considering the environmental impact, the government has imposed strict laws on sand mining. Due to this reason, certain individuals have focused on mining inland dunes. However, sand excavated from inland dunes contains higher percentage of cohesive sediment (mud) which exceeds the recommended limits, posing difficulty in controlling cracks and ruptures that may appear in structures made of such concrete.

Under such circumstances, it is imperative for both government and the private sector to intervene in the matter and prevent an imminent collapse in the construction industry. As an alternative, sand can be pumped from the deep sea and can be delivered after controlling salt levels. Currently the Sri Lanka Land Reclamation and Development Corporation have taken the initiative in this regard and with the collaborative support from the private sector, it would be possible to meet the rising demands.

Gravel and sand

Extraction of gravel and sand poses great difficulty for construction sector. Even though geographical mapping take place to certain extent, the problem remains unaddressed.

Metals

As the construction industry expands rapidly, a metal shortage will be imminent. Furthermore, high quality metal with standard sizes will become a rarity as well.

With the boom in construction industry, demolition of old constructions takes place more frequently. It is important to devise a plan to recycle and reuse such waste debris following a demolition.

For example, Galle Municipal Council has successfully up cycled debris waste and incorporated them in their constructions for more than 10 years. Galle Municipal council has set an ideal example to all other institutions in the country.

Reinforcement

The increasing demand for reinforcement causes a high competition in the market, which leads manufacturers to sell their products at economic rates. Industrial experts have warned that constructions that incorporate substandard reinforcement are likely to collapse in due course.

New technology

Sri Lanka is hesitant about going beyond traditional construction boundaries, and the situation has critically deterred the progress of all sectors including financial management, technology and project management.

In order to overcome this situation, the Construction Industry Development Authority should adopt stringent supervision, and uplift the industries with the collaboration of Contractors' Union. In addition, it is also imperative to apply modern technology to alleviate problems related to raw material.

Furthermore, local contractors should be given an opportunity to collaborate with international firms when implementing foreign funded mega projects. Government's intervention is critical in such instances, which would help local contractors to enhance their knowledge, capabilities and skills.

Skilled labour

Currently Sri Lanka is experiencing a shortage in skilled labour. Due to this reason, local contractors find difficulty in meeting project deadlines.

According to the Central Bank reports, total value of construction contracts amount to Rs. 15 billion by 1995, while this value has increased to Rs. 200 billion by 2015, denoting a staggering increment of 1233%.

However, in contrast to this hike, the skilled labour has only increased by a mere 8%. To overcome this issue, vocational training subjects should be included in the school curriculum from a lower grade, and only teachers with special training should be assigned for the relevant subjects.

Even though there are majority of unemployed youth in the country with the potential to draw a higher income in the construction sector, it would be difficult to incorporate the youth without alleviating deep-rooted misconceptions regarding the construction industry.

The problem can be addressed to a great extent if the public and private sectors implement a joint program to address the issue on a broader perspective, present the recruits with new titles,

uniforms, identity cards and offer bank loans while creating an employee-friendly working environment.

Construction equipment

Large number of construction companies manages the construction work with second hand, outdated or less maintained construction equipment. The machinery and equipment used by the majority of the contractors, fall in to the following categories;

- Acquired from foreign contractors who left behind after completing the assignment
- Used equipment imported from other countries

Hence special emphasis shall be given to provide with the modern machinery and equipment for the construction industry. The state sector shall play a major role in his aspect.

Regulation of constructions

The Construction Industry Development Authority (CIDA) is responsible for regulating constructions within Sri Lanka. The institution is also involved in grading and registering contractors, training labourers and determining limitations of raw materials related to the construction industry. However, the institute has not been able to perform as expected due to the lack of funds exclusively specified in the same Act.

1.2 Construction Material Resource Requirement

The cost estimation prepared during the bidding stage may not be same as the cost calculated at the time of actual work done. This is because of open market escalation of construction inputs. To address this problem, CIDA has introduced a country-specific document “CIDA formula method for adjustments to contract price due to fluctuation in prices”. Price fluctuation formula mainly considers several parts; value of work done for a particular period, non-adjustable work elements, cost of materials at site, percentage input contribution from each construction inputs and price indices variation compared to the start of the project, which needs careful attention.

It is obvious that many construction projects last for a long duration. Also, the time of preparation of the tender, time of awarding the tender and the time of completion of the project has a significant difference. Due to the price fluctuation of materials, equipment, labours, etc., bid amount for a particular project can be varied from the actual construction cost. CIDA formula is a

“country-specific” approach with the aim to provide a reasonable basis for calculating price adjustments due to open market escalation in specified construction inputs such as major building materials, hire charges of plants and wages for the labour. The Choice of those inputs largely depends on the principle of cost significance in the overall share of the quoted tender price. Adjustments to the contract price shall be made in respect of not only in the rise but also in fall in the cost of materials and other inputs affecting the cost of execution of works.

Good quality Construction materials are not available in adequate quantities or at affordable prices. Construction materials are largely based on non-renewable resources. Therefore, strict guidelines on the extraction and usage are in place for maintaining inter and intra-generation equity. The cost of transportation coupled with regulations on transporting these materials can also limit supply further. Although the Sri Lanka Standards Institution (SLSI) has specified quality standards for all construction materials, there are weaknesses in the implementation and monitoring of these standards. Despite the guidelines, market forces continually drive demand for the supply of low quality materials.

Insufficient alternative materials: As discussed, the main geological resources that are being used by the construction industry are non-renewable resources such as metals (ore), sand and minerals. It is increasingly difficult to find alternative materials and as the availability of existing resources diminish their costs increase. Many respondent contractors therefore recommended that rather than searching for alternative construction materials, It is time to examine alternative resource efficient methods of construction. However, new technology is expensive and the industry will require access to specialized training and support to pursue such methods.

2.1 Human Resource Requirement and its Contribution to the Industry

2.1.1 Background

Construction Industry plays a major role in economic development of the country with its contribution to the GDP amounting to 6.3-8.1 % and engagement of over 7% of the total labour force. Traditionally, the majority of the construction work had been carried out with the involvement of three parties: the client, the consultant and the contractor.

All construction work is undertaken as projects and project management practices used by all three parties usually determine the success or failure of any project. The life-cycle of a project in reality goes beyond the implementation stage (or as usually known as the construction stage) although many involved in the industry do not realize. For example, project management should ideally begin at the initial stage of concept development even before the selection of a consultant to design the work. To cut a long story short, the proper application of project management in all stages of development projects is rare in Sri Lanka, which is the main reason for many project failures. The role to be played by the Project Manager in the Construction Industry is so important that the construction industry development shall address the issue of lack of proper management of projects as an important factor affecting the development of the industry.

Sri Lanka has a shortage of skilled labour in the construction sector. Shortage of carpenters, stonemasons and electricians are particularly evident. There are also quality issues with respect to machine operators and technicians. A limited knowledge base amongst trained engineers is also noted.

The country is home to over 2500 registered local construction firms. The Construction Industry Development Authority (CIDA) has categorized these construction companies in Sri Lanka while taking into account the company's financial assets, technical capabilities, and field-specific experience.

The significant role played by unskilled labour in the industry and project delivery is not adequately recognized. Unskilled labour is expected to be abundant so long as the active labour force remains healthy. However, as opposed to skilled labour, the supply of unskilled labour is dependent on many external factors. For example, seasonal demand in the farming sector and climatic conditions can greatly affect the supply of unskilled labour. This in turn affects the delivery of the construction projects. There are minimum standard wages for unskilled labour but the perception of the labourers suggests that these are not adhered to. This forces the available unskilled labour toward projects that pay higher wages.

Budgetary constraints prevent employers from making construction sector employment more attractive. Contractors are unable to attract young tradesmen because they do not offer adequate incentives such as an attractive pay package, learning development opportunities and a knowledge sharing culture. Whilst contractors would often like to make provision for these, constant budgetary constraints prevent them from doing so. Ceiling rates assigned by donors often restrict project managers from recruiting experts with practical knowledge and experience, especially in the professional staff categories. International staff and local staff knowledge, skills and experiences showed a difference in most cases.

It is important to remove the social stigma of a career in construction. The existence of a social stigma towards blue colour jobs is a reality in Sri Lanka. There is a pervasive notion that career success is achieved only through white colour jobs. Professions such as masonry, welding, construction labour are not considered to deliver high enough dividends in terms of job satisfaction, income and social status. The importance of their roles to the local economy and respective industry needs to be recognized and established in the social consciousness. Even though the construction industry employment is believed to be better than other professions, the job-seeking youth are reluctant to enter the industry. Stemming from the lack of clarity, labourers at field level (especially in rural areas) are often unaware of the wider opportunities for skills development and employment. Although their skill set maybe internationally sought after, there is a widespread lack of awareness about the qualifications required to secure employment. The attractiveness of the trade is inadequately promoted at this level.

All public works system possess established procurement processes that are currently being implemented. However issues pertaining to their efficiency and effectiveness can be identified.

Low usage of up-to-date methodology in the procurement process has a significant negative impact on its efficiency. Use of Information Technology (IT) systems to monitor procurement could easily enhance the effectiveness of the procurement cycle and will also improve record keeping while enabling quick retrieval of information. Lack of IT system has had a negative effect on procurement supervision. Furthermore, whilst procurement plans are prepared at the project inception phase, procurement management tends to be a reactive process.

Foreign Demand for Skill Construction Craftsmen

The outflow of skilled workers to more lucrative employment opportunities overseas contribute to a shortage of skilled labour within the country. Skilled labour is expensive and it is perceived that the industry lacks the capacity to meet domestic salary demands for skilled

labour. This is more evident locally where skilled labour in the local construction industry is being absorbed by foreign countries with higher wages. For example, in 2010 there were a recorded 30,000 foreign construction industry job orders filled through Sri Lanka recruitment agents of which 7,500 were for masons highlighting the need for more training programs and on-the job skills development.

2.1.2 Recommendations to develop Human Resource Capabilities and Capacities in the Construction Industry

The goal of the Human Resource Development Plan was to provide the Construction Industry with the information to be able to make decisions about the future of their human resources and to have an understanding of the approaches and the tools which will help them to continue to monitor and plan for their human resources as circumstances change in the future.

The objectives were as follows:

1. Assess the adequacy of present skilled persons at public and private stakeholders at head offices, construction sites, in different categories.
2. Document the distribution and qualifications of managerial, supervisory, technical staff and skill/unskilled personnel within the construction industry and bodies related to supporting the functions of the construction industry.
3. Assess the adequacy of the present training capacity in the country & define the possible need for extra facilities and trainers.
4. Assess the current employment policies & practices to explore how current regulations & practices facilitate or hinder effective human resource management.
5. Provide construction industry with quantitative information about the numbers of persons required for fulfilling the future demand and design on the basis a plan which describes the training and human resource management needs to achieve the targets.

Training Capacity Analysis

The most signifying field of activity in Human Resource development in Construction industry is the training. Training is the purposely structured process which leads to individual achievement of a performance which is:

- Mutually desired by the individual and the organization.
- Dependent on the acquisition of Knowledge, Skill, Attitude (KSA).
- Not dependent on the environment or motivational factors.

Vocational training in Sri Lanka is carried out by several state organizations functioning under different ministries.

- Ministry of labour & Trade Union.
Department of Labour
- Ministry of Housing & Construction
Construction Industry Development Authority (CIDA)
- Ministry of Skills Development & Vocational Training
Tertiary and Vocational Education Commission (TVEC)
National Apprentice and Industrial Training Authority (NAITA)
Vocational Training Authority of Sri Lanka (VTA)
University of Vocational Technology (UNIVOTEC)
Department of Technical Education & Training (DTET)
- Ministry of Project Management, Youth Affairs & Southern Development
National Youth Services Council (NYSC)

Attracting Youth to the Construction trade will be a challenge. Revival of the awards for achievement and skills certification schemes, initiated in early 1980's by ICTAD and thereafter in year 2000 by the TVEC has given a boost to craftsmen to take up NVQ certification

- It provides a qualification scheme that recognizes skills attained providing them mobility in employment prospects
- It enables upward career progress up to sub-technical and technical levels facilitated by the NVQ scheme

Providing a long term Insurance with pension benefits is another action proposed. Under the provisions of the Construction Industry Development Act, a Long Term Insurance Scheme, with pension benefits will be implemented for the craftsmen registered with the Construction Industry Development Authority (CIDA) who are not entitled to any form of retirement benefits under any other scheme.

This is a contributory scheme where the craftsman and CIDA will share the monthly premium in respect of the pension benefits Policy and CIDA picking up the annual full premium in respect of the accident and illness Policy.

2.2.1 Share of Foreign suppliers for construction materials

Sri Lanka is joining other countries in moving from a traditional approach to road infrastructure and maintenance which pays the contractor based on progress, to a new approach based on contractor performance. This approach will create incentives for better quality and timely interventions which will provide the public with better maintained roads at a lower cost to the government.

“These types of contracts will benefit the Government, contractors and the general public by saving costs and serving as a model that could be adopted by many other sectors in the future.”

The loan for this project is provided by the International Development Association (IDA), the World Bank’s grant and low interest arm, with a maturity of 25 years that includes a grace period of five years. The project also supports a program financed by the Asian Development Bank (ADB). The RDA is the lead implementing agency.

Technology Resource Requirement

Development of new technology in the construction sector

The newest technology that the majority of apartments and buildings construction companies use today is the precast concrete or pre-fabricated construction. This is a construction product produced by casting concrete in the reusable mold or ‘form’ which is then cured in a controlled environment, transported to the construction site and lifted into place. This precast concrete is manufactured offsite which reduces construction time, cost savings, less waste. Also there’re some construction companies that do onsite molding as well.

A part from major infrastructure projects traditional system of construction is still prevalent in the Sri Lanka construction industry. Need for new technology development is a priority due to the quality and productivity demand and high cost of construction using traditional techniques. In this context following proposals are made to the government

1. to establish a research and development fund to carry out applied research work.

2. to establish a database for retaining technology.

Sri Lanka has developed a satisfactory precast base for several years now but there is still a large scope for expansion. Precast and precast-prestressed technologies may be the answer for high construction costs and a cost-effective alternative for the depleting natural resources such as timber. The State Engineering Corporation and a few private firms have built up the required know-how in this field and have shown remarkable results in large-scale projects.

Prefabrication

Prefabricated concrete items were introduced to Sri Lanka by the State Engineering Corporation (SEC) and State Development and Construction Corporation (SD&CC). The demands for prefabrication arise when speed and high-quality construction is required. This is particularly true for repetitive type of works. Pre-fabrication is popular in the following areas:

1. Bridge beams, road kerbs
2. Hume pipes, septic tanks
3. RC purling, thin RC beams, roof tiles
4. Decorative concrete items
5. Doors, windows
6. Suspended ceilings, floorings, tiles, etc.

Presently, most of the major concrete pre-casting works are done in public organizations, but increasingly more private sector organizations are getting involved in the business as well. However, pre-casting of concrete items is a common feature in all the large construction sites in order to achieve the required progress. The pre-cast concrete works industry is not popular among the normal house builder due to the requirement for cranes etc. for lifting and placing.

Construction Industry Development Authority which is the apex body in Construction Industry is mandated to regulate, register, formalize and standardize the activities of the Construction Industry in Sri Lanka has identified parameters affecting quality such as standards, processes, procedures, documentation, practices etc. has several mechanisms in place to promote quality of construction.

The senior official also stated that building materials and supply chain have improved cost efficiency and many energy efficient materials have come into play. Today buildings and apartments are built in such a way, that they are sustainable with less carbon emission where lots of energy consumption materials are in place.

One other important technology that construction companies have adopted is the use of Buildings Information Modeling (BIM). It is an intelligent 3D model-based process that equips architecture, engineering and construction professionals with the insight and tools to more efficiently plan, design, construct and manage buildings and infrastructure.

Some of the benefits of using the tool are that it provides more consistent, more accurate and less time consuming project document generation for buildings. "Many new builders want their contractors to use this technology. There is data that they can capture and capitalize on other projects," the senior official noted. Laser scanning is another new technology adopted in the construction sector. A technology which uses 3D laser scanners that can create digital reproduction of the dimensions and positions of objects in a certain space and give a better picture.

One of the unique and exquisite apartment complexes the country is looking forward to is the 'Altair' in Colombo. A design the country has never witnessed before, this is a composite structure made out of pure concrete and steel. Grant Hyatt Colombo is standing out as the tallest apartment cum hotel complex in Sri Lanka with 47 stories which is to be opened by the end of this year, the Lotus Tower as the tallest vertical structure and Clear Point Residencies remains the tallest vertical garden in the world which is to be opened mid this year, the senior official stated.

Financial Resource Requirement

Construction costs have risen steadily over the past decade, as demand has grown and the price of labour and building materials have climbed. Sri Lanka imports the majority of construction materials used, and the weakening of the rupee since 2015 has driven up prices.

The CBSL's cost index for all forms of construction, which uses 1990 as the base, rose from 370.2 in the first quarter of 2007 to 654.1 in the last quarter of 2016, representing a 77% increase over the period. The index rose 3.8% in 2016 alone, from 630.3 at the end of 2015. "Construction costs are driven by four major factors, "First, almost all materials are imported, and taxes and import levies push up costs. Second, labour productivity is low and the net labour cost is very high, so thousands of workers are brought in from China, Bangladesh, India and Nepal. Third, the cost of energy is also high. Lastly, logistics tend to become expensive due to invariable delays in clearing materials from the ports."

Rising costs have, in turn, had an impact on property prices and affordability for purchasers, while also eroding developers' margins in the middle-income segment. High input prices have also led

the authorities to look afresh at PPPs in order to share the cost of investment with the private sector.

The CBSL has been cautious about the growth rate of credit to the private sector, implementing a series of interest rate hikes and an increase to the minimum reserve requirement in 2016-17. Aware of concentration risks, commercial banks have also looked to rebalance their portfolios and reduce overall exposure to the real estate and construction sectors. However, given the rate of total credit growth – expected to be 16-18% in 2018-20, according to Colombo-based investment bank First Capital – it will be possible for banks to reduce overall exposure while maintaining a steady flow of lending to these sectors, rather than drastically shrinking the amount of credit offered.

Sri Lanka scores relatively high in the region for its construction legislation. In the “Doing Business 2018” report published by the World Bank, Sri Lanka ranked 76th out of 190 economies for ease of dealing with construction permits.

3.0 Recommendations & Conclusion

The construction sector grew by 12.8% in value-added terms during the first half of 2017, down slightly from 13.5% in the same period of 2016, according to an economic developments report published by the CBSL in November 2017. The strong growth in construction activity also helped drive expansion of 18.1% in mining and quarrying in the first half of 2017.

The CBSL stated in the same report that private construction of condominium and commercial real estate would continue to drive overall private investment growth in 2018. It forecasts that government investment will also forge ahead, with certain infrastructure projects prioritized to support economic growth.

Renewed growth in Sri Lanka’s construction industry is being supported by a combination of mega-projects with international partners, strong domestic demand and public investments in infrastructure. Following a slowdown in 2015, the sector is once again enjoying double-digit growth, possessing a strong order book with international investors increasingly present. Still, costs are high and rising, and there are risks to the outlook, while the pace of reform and government project roll out can be slow. However, new initiatives for public-private partnerships (PPPs) and the progress being made on key developments bode well for the future.

The construction sector has come a long way within the last 10 years. More and more foreign companies have come and invested in the country while extremely talented local companies are using new techniques and standards that are prevalent worldwide.

Further construction industry shall be encouraged to use green building techniques such as recycling of waste/ materials, energy conservation, use of renewable energy etc. Special incentive schemes shall be made for the use of green building technology.

The high growth of construction industry and the environmental concerns made fast diminish of traditional construction raw materials. Anyhow still effort given to use of alternative materials are discouraging. Most of the contracts documents/consultants do not allow even to propose alternative materials and/or construction techniques.

A special concern shall be given to use alternative construction materials and techniques that do away or reduce the use of traditional scare construction materials. The designers, Architects, project managers shall be encouraged to use of these materials/techniques in construction.

Sufficient allocations shall be made to research and development and make sure the funds are disposed effectively.

All grades of technical employees of the construction industry needs to be guided and trained on the allocated jobs and of future targets. This is an essential part in developing the construction industry to face challenges and bad situations encouragingly. Further they will learn to practice new techniques in construction and management effectively. This guided training shall be applicable to highest level of the management also..