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The institutional framework of construction safety management: A case study of Sri Lanka

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Abstract. The Sri Lankan construction sector continued to boom in the last decade reporting a 6.78 per cent growth in GDP in 2019. Nonetheless, construction accident statistics recorded 40 fatal and 59 non-fatal accidents in 2019. There is a serious lack of safety management in construction companies in Sri Lanka. The reason is largely attributable to the lack of an institutional mechanism to ensure accountability, planning, prioritising, reviewing, learning, and training for continuous improvement of safety. Therefore, it is necessary to explore the system of laws, regulations, and procedures, and stakeholders with their roles and norms that shape construction safety. The study explored how national level and industry level institutions are linked to construction safety management systems in Sri Lanka through document review and interviews with personnel from the Department of Labour, Construction Industry Development Authority, construction companies, professional bodies, and academic institutes. The Factories Ordinance, No. 45 of 1942 is the main legislation applied to construction safety enacted in the colonial period, thus, no improvements are made to industry-specific requirements and technological advancements. Neither, the Construction Industry Development Authority has any standards, guidelines, or codes of practices to conform to safety. Major construction companies align with international standards (ISO 9000, 14000; OHSAS 18000) to win major construction projects. It indirectly affects maintaining a safe work environment. Therefore, Sri Lanka needs to focus on an industry-level institutional mechanism to improve the safety management system. Further, support from educational and training institutes, trade associations, and professional bodies is necessary to push forward the importance of safety.

1. Background

Occupational accidents and hazards are common phenomena in the construction industry [1]. According to the International Labour Organisation (ILO), it counts for a thirty per cent share of all occupational fatal accidents. Further statistics show the likelihood of occurrence of fatal accidents in the construction sector is 3 to 4 times greater than in other industries in developed countries while it is 3 to 6 times in developing countries [2]. Construction is quite different from other industries due to its complicated processes, changing work locations, and complex work environments [3-6]. Construction sites feature numerous moving parts, including heavy machinery, building materials, and various quantities of



construction professionals trying to get the job done in time and on a budget [7]. Also, it encompasses activities that are classified as low risk and high risk where most accidents and fatalities resulting from high-risk activities [8]. Especially, the characteristics of worker behaviors that are not standardized as in the manufacturing industry have a greater impact on on-site safety measures [9]. So, the management of safety conditions in this industry is challenging.

Safety management is the key to ensuring that safety measures are implemented on construction sites [6]. Various operations are integrated with the construction safety management framework to reduce the likelihood of occurrence of accidents and other workplace-related hazards [10]. Traditionally, safety management systems were based solely on the safety regulations of the time. They followed the prescriptive approach where detailed safety standards and procedures on technical/engineering actions to be taken were provided [11, 12]. Government inspectors were appointed to check if the companies were operating according to the legislation. It was assumed that if the companies were legal then they were safe [13]. However, this practice ruled out the important site-specific facts such as the number of workers at a particular spot, exactly what kind of dangers the workers are exposed to, etc. It severely compromised the quality of the safety management framework [14]. With time, the regulatory emphasis changed to a performance-based approach [15]. The safety goals were generally stated, and firms had to decide how to achieve these goals to ensure the safety of all the stakeholders including sub-contractors, suppliers, workers, customers, and the public [16]. Due to the generally stated safety goals in law, the regulators are required to define what is reasonably practicable in the first place [17]. Apart from these regulations and guidelines, organizations face pressures due to market conditions, education and training needs, and expectations from customers, clients, and institutions to maintain an effective safety management system [18].

2. The problem

Sri Lanka is ranked at a low level of occupational health and safety performance [19]. Poor working conditions, unsafe behaviors, and unsafe acts result in higher levels of absenteeism and turnover in the 8.7 million labor force [20]. The Department of Labour inspected a total number of 4943 factory accidents and investigation complaints in 2017. Among them, 68 investigations were on fatal accidents and 1451 inspections were on non-fatal accidents [21]. Sri Lanka's construction sector continued to boom in the last decade with the development of high-end residential, commercial space, hotel and resort construction, and infrastructure. The construction industry contributed 6.2 per cent of the country's GDP in 2020 employing around 600,000 workers [22].

The boom in the construction industry and poor occupational health and safety performance make construction workers more vulnerable to occupational accidents. According to the Department of Labour [21], the highest number of fatal accidents was reported in the construction sector. Bareheaded and barefooted/slippers worn construction workers, and overhead work without safety nets are common on construction sites [23]. In 2019, construction recorded 40 fatal and 59 non-fatal accidents [24]. The majority of the fatal accidents are caused by falling from heights, followed by being struck by an object, and electrocution while non-fatal accidents were caused mainly due to being struck by an object, followed by falling from heights [25]. Inadequate or absence of regulations, policies, resources, and commitment are the reasons for poor occupational safety performance in the construction industry [26]. According to a study conducted with 22 construction companies in Sri Lanka, it was identified that 68% of them did not have a written health and safety policy, 72% did not have procedures for undertaking risk assessments and 73% did not have formal health and safety training program [27]. Sri Lanka lacks improvement measures for better construction safety performance [19]. This is an institutional issue caused by multiple facets of governance and culture that hold the industry back from continuous improvement.

3. Research methodology

The objective of this study is to understand the institutional framework: "the system of laws, regulations, and procedures, stakeholders with their roles and norms" [28] that shape the construction safety

management system in Sri Lanka. The research started inquiring about the Sri Lankan construction industry in terms of procurement, investments, employment, training, and education. Secondary sources such as journal and conference papers and reports were used. The main line of inquiry was how construction safety is shaped by industrial health and safety regulations, construction industry regulations, and stakeholder influences. Seven semi-structured interviews were conducted to collect evidence on how safety regulations and industry practices interact with each other to form the institutional framework. Interviewees were from the Department of Labour, Construction Industry Development Authority (CIDA), construction companies (safety professionals and top-level management), professional bodies, and academic institutes. All interviews were tape-recorded and transcribed verbatim. Respondents had an average work experience of 17 years in their respective fields. The diverse backgrounds of interviewees ensured that the findings would not be biased towards a certain sector. The qualitative data were analysed using content analysis drawing on the indicators of national and industry level regulatory, advisory and consultancy, training, and educational institutions to identify the direct and indirect influence on construction safety. Additionally, inefficiencies in the regulation and its enforcement mechanisms, loopholes of the safety management system are identified.

4. Overview of the construction industry in Sri Lanka

The construction industry became one of the major beneficiaries of Sri Lanka's rapid economic development at the end of the 30-years long armed conflict in 2009. Within the last twelve years, the construction sector recorded growth as twice as fast as the nation's GDP due to its unprecedented development of high-end residential, commercial space, hotel and resort construction, and infrastructure. The bulk of the construction activities is generated from the infrastructure development segment [29]. The World Bank, the Asian Development Bank (ADB), and the Japan International Cooperation Agency (JICA) fund most of the infrastructure projects including expressways, highways, power plants, water distribution, and wastewater projects [30]. Also, government policy encourages private investment in the construction sector [31]. As a result of attractive investment opportunities, Foreign Direct Investments (FDIs) are progressively replacing locally generated funds. There is growing competition among several nations for FDIs due to the country's geographically strategic location near two high-growth regions, i.e., India and Southeast Asia. China, Hong Kong, India, and Singapore were the country's largest investors in 2018 [32].

There are many small and medium-scale construction companies in Sri Lanka [33]. Construction companies are registered and graded by CIDA according to their abilities and specialist fields. In 2019, 4,868 practising construction companies were registered with CIDA. As a result of FDIs and loans, most mega and complex construction projects are carried out by foreign companies (they are also required to register with CIDA) with local companies acting as sub-contractors [34]. To minimize the repercussions of the cyclical nature of construction demand and to achieve flexibility, local construction companies have resorted to the use of subcontractors [35]. In terms of project procurement, both the private and public sector clients widely follow the traditional procurement system [36]. Most construction firms obtain a high percentage of their work through competitive bidding. The nature of the client is a key factor affecting both bid/no-bid and percentage mark-up decisions [37]. However, the demand characteristics have resulted in non-traditional project delivery systems such as design and build and its variants such as turnkey and more recently Build-Own-Operate (BOO)/Build-Operate-Transfer (BOT) arrangements [38].

The construction sector currently provides over 7% of total employment in the country [34]. A survey of employees in the construction industry revealed that about 11% of them were in professional grades, 12% in technical grades, 71% in craft grades, and 6% in operator grades [39]. A significant portion of the construction workforce is casually employed and has had no proper training in any trades [40]. Female participation in the construction industry in Sri Lanka is only 1% [41]. There is a shortage of people in the construction industry in the categories of unskilled workers, skilled workers (craftsmen such as masons, carpenters, plumbers, welders, fitters, etc.), and construction machine operators [42]. For example, according to a report by the Tertiary and Vocational Education Commission, Sri Lanka,

in 2016 skill demand is about 118,251 per year whereas the intake capacity is 37, 830 (for vocational training courses of 24 occupations – craftsmen, machine operators and allied supporting categories). Industry demand for masons is about 46, 676 whereas intake capacity is about 2,758. It is said that about 75% of the capacity is not utilized due to a lack of interest in the training of masonry jobs. Some of the training programmes are about to close without sufficient applicants [43].

5. Research findings and discussion

5.1. Occupational health and safety regulations

The history of industrial health and safety in Sri Lanka extends as far back as 1896, with the enactment of the Mines and Machinery Protection Ordinance. This Ordinance mainly covered mines and allied industries. However, in 1926, under section 4 of this Ordinance, certain rules were made by the Governor and published in the Ceylon Government Gazette No. 7553 of 29 October 1926. These rules applied to all factories that existed in Sri Lanka at that time. Thereafter, the Government enacted the Workmen's Compensation Ordinance, Act No. 19 of 1934. The objective of this Ordinance is to obtain compensation from employers to workmen injured from accidents while at work or to workmen suffering from diseases attributable to the nature of employment and their dependents in case of death of workmen from such causes. It was finally amended in the year 2005. The office of the Commissioner for Workmen's Compensation is the authority of this ordinance. The main function of this office is to inquire about the claims made by the workmen who met with accidents in the course of their employment. This office functions entire, in a judicial capacity. The Commissioner, Additional Commissioner, and the Deputy Commissioner are full-time Judicial Officers.

With the development of the industrial sector in Sri Lanka, the Factories Ordinance (Act No. 45 of 1942) was promulgated on 1 January 1950. The Factories Ordinance, Chapter 128 of the Legislative Enactments of Sri Lanka, is an Act that makes provisions for the safety, health, and welfare of workers in factories. This Ordinance has subsequently been amended by several Acts in 1961, 1976, 1984, 1998, 2000, and 2002. This Ordinance has 131 sections, which prescribe the minimum standards that should be maintained by the employer to provide a safe work environment for the workers. The Industrial Safety division of the Department of Labour has the authority to enforce the Factories Ordinance. It is headed by the Commissioner of Labour (Industrial Safety) and the Chief Factory Inspecting Engineer who are assisted by the Deputy Commissioner of Labour (Technical), the Deputy Chief Factory Inspecting Engineer, and a team of Specialist Factory Inspecting Engineers. Services of the division are decentralized through ten (10) District Factory Inspecting Engineer's offices at Anuradhapura, Badulla, Colombo, Gampaha, Galle, Jaffna, Kandy, Kalutara, Kurunegala, and Ratnapura. The District Factory Inspecting Engineers are responsible for enforcing the Ordinance within their areas of jurisdiction. For this purpose, each District Factory Inspecting Engineer is assisted by a few Factory Inspecting Engineers.

Enforcement of the Factories Ordinance takes place through inspection of factories, registration of factories, approval of building plans, investigation of accidents, investigation of complaints, and analysis of accidents. Each Factory Inspecting engineer is expected to carry out 15 to 20 routine inspections a month. Besides this, they are responsible for investigating fatal and serious accidents. In case of serious violations, especially leading to fatal accidents, the Inspectorate institutes legal action against the occupier of the factory. Further, it provides advisory services for the improvement of the work environment in factories and conducts safety audits. Another important function handled by the Inspectorate is the implementation of educational and awareness programs.

There is a new Act – “Occupational Health and Safety Welfare Act” – drafted by the Department of Labour to cover health and safety practices in all workplaces. This Act is based on the Health and Safety at Work Act of the UK. The Act defines the responsibilities of the employers, planners, builders, designers, manufacturers, suppliers, self-employed persons, and persons in control of workplaces, and workers in respect of safety and health in the workplace. The new Act is waiting for cabinet approval.

The construction industry was identified in the Factories Ordinance by provision 37 of Law No. 12 of 1976 in Section 84. When a new construction site is started, the site should register with the Department of Labour. After the registration, District Factory Engineers are supposed to conduct random inspections. A record book is provided to each site upon registration. This register should be kept on every site duly updated. It should record accidents and dangerous occurrences, cases of industrial diseases, and poisoning. Further, it includes accident notification procedure, periodic test requirements of machinery and equipment and forms to be filled by District Factory Engineer upon site inspection and accident follow-up.

Sri Lanka Standards Institution (SLSI) is indirectly related to the occupational health and safety regulatory system of Sri Lanka. It is a certification body for Occupational Health and Safety Management Systems, OHSAS 18001:2007. The systems certification division of the SLSI employs trained and qualified auditors to certify organizations that wish to adhere to occupational health and safety standards. The rules and regulations for certification have been established in compliance with international guidelines. SLSI also provides training on OHSAS 18001.

5.2. Occupational health and safety advisory and consultancy

Sri Lanka obtained membership in the ILO in 1948. In 1995, National Workers' Charter was enacted by the Department of Labour to conform to international labor standards. ILO developed the Decent Work Country Programme (DWCP) from 2013 to 2017. This explains the policies, strategies, and results required to realize progress towards the goal of decent work for all. Further, ILO supported the Department of Labour in developing the new legislation, "Occupational Safety, Health, and Welfare Act", and supported the government to expedite its passage through the parliament. ILO provides financial support to print safety posters, translate books, develop educational material, and conduct the annual safety week.

The National Institute of Occupational Safety and Health (NIOSH) was established on 28th April 2005 as an affiliated body to the Ministry of Labour and Labour Relations by National Vocational Safety and Health Institution Act No. 38 of 2009. It provides safety training programs, laboratory services, medical examinations of workers, company medical examinations, safety audits, and risk assessments. NIOSH is committed to providing better working conditions for the working population, through increasing awareness of and adherence to appropriate health and safety legislation. Their activities are implemented to disseminate updated information and to provide advisory and consultancy services. The institute educates and trains employers, employees, and all other categories of people as well as conducts investigation studies, surveys, and research in the field of occupational safety and health. The institute is also dedicated to preventing accidents and diseases by promoting the enforcement of health and safety policies and methodologies.

5.3. Occupational health and safety training and education

Following universities and academic institutes conduct courses on occupational health and safety.

- Department of Building Economics, University of Moratuwa – M.Sc. in Occupational Safety and Health Management
- National Institute of Occupational Safety and Health (NIOSH), Sri Lanka - Diploma in Occupational Safety and Health; Certificate in Occupational Safety and Health
- Construction Industry Development Authority - Diploma in Construction Occupational Safety and Health; Certificate in Construction Occupational Safety and Health; Construction safety and occupational health training programme
- Advanced Construction Training Academy – Diploma in Safety Engineering; Three days short course on Occupational Health and Safety at Construction Work Sites
- The National Examination Board in Occupational Safety and Health (NEBOSH), United Kingdom - International General Certificate in Occupational Health and Safety

- Chartered Institute of Personnel Management Sri Lanka (CIPM) - Executive Certificate in Occupational Safety and Health

5.4. Construction safety regulations

CIDA has the authority in the development, facilitation, and regulations of training, expertise, and quality assurance in the construction industry within the framework of national policies. CIDA comes under the purview of the State Ministry of Rural Housing and Construction & Building Materials Industries Promotion. CIDA was established as the successor to the Institute for Construction Training and Development (ICTAD) under the provisions of the Construction Industry Development Act No. 33 of 2014 (CID Act). The Act came into operation on 29th December 2014. CID Act was established to regulate, register formalize and standardize the construction industry and thereby, provide for the development of the construction industry in Sri Lanka.

In 1989, a central registration scheme was started by ICTAD for registering construction companies to avoid anomalies and maintain uniformity. Every organization engaged in identified construction works is required to register with CIDA. Further, every foreign construction company must obtain a temporary registration from CIDA before engaging in any construction work in Sri Lanka. This registration is a requirement for obtaining government projects. The current grading system classifies general construction companies (who are involved in buildings, highways, bridges, water supply, and sewerage, irrigation works) under 11 grades CS2-CS1 and C1-C9. Financial limits for these categories are set to suit the current position of the construction industry in Sri Lanka. The grading system prevents organizations from undertaking projects beyond their capabilities, and, motivates them for self-development and upgrading. Once granted, the registration is valid for 3 years and needs to be renewed, thereafter.

Construction companies should provide up-to-date safety management system certificates (ISO 45001 - Occupational Health and Safety Management System) to register and renew their grading. ISO 45001 is mandated only for CS2 and CS1 construction companies who are eligible to carry out projects with a contract value of more than 1500 million LKR (~ 7.5 million USD). ISO 45001 pushes to maintain effective occupational health, safety, and wellbeing management system at site from the first registration of the site with the Department of Labour. It prescribes organization has a safety manual and a safety policy. The certifications can be applied through a third-party organization that is eligible to conduct audits and provide the certificate. In the first instance, the applying organization needs to renew the certificate once every six months and when the organization becomes older with the certification, the auditing frequency reduces to once every nine months and to once every year. An issued certificate is valid for three years and once every year an audit is conducted.

5.5. Construction safety advisory and consultancy

Following trade associations and professional bodies provide advisory and consultancy on construction safety. They held trade fairs, conferences, seminars, and continuous professional development events, but their contribution is minimal and indirect.

- Chamber of Construction Industry
- Ceylon Institute of Builders
- Institution of Engineers, Sri Lanka
- Sri Lanka Institute of Architects
- Institute of Facilities Management Sri Lanka
- Institute of Quantity surveyors Sri Lanka
- Major Constructors of Sri Lanka
- National Construction Association of Sri Lanka
- Young Constructors Forum
- Lanka Ready mix Concrete Association

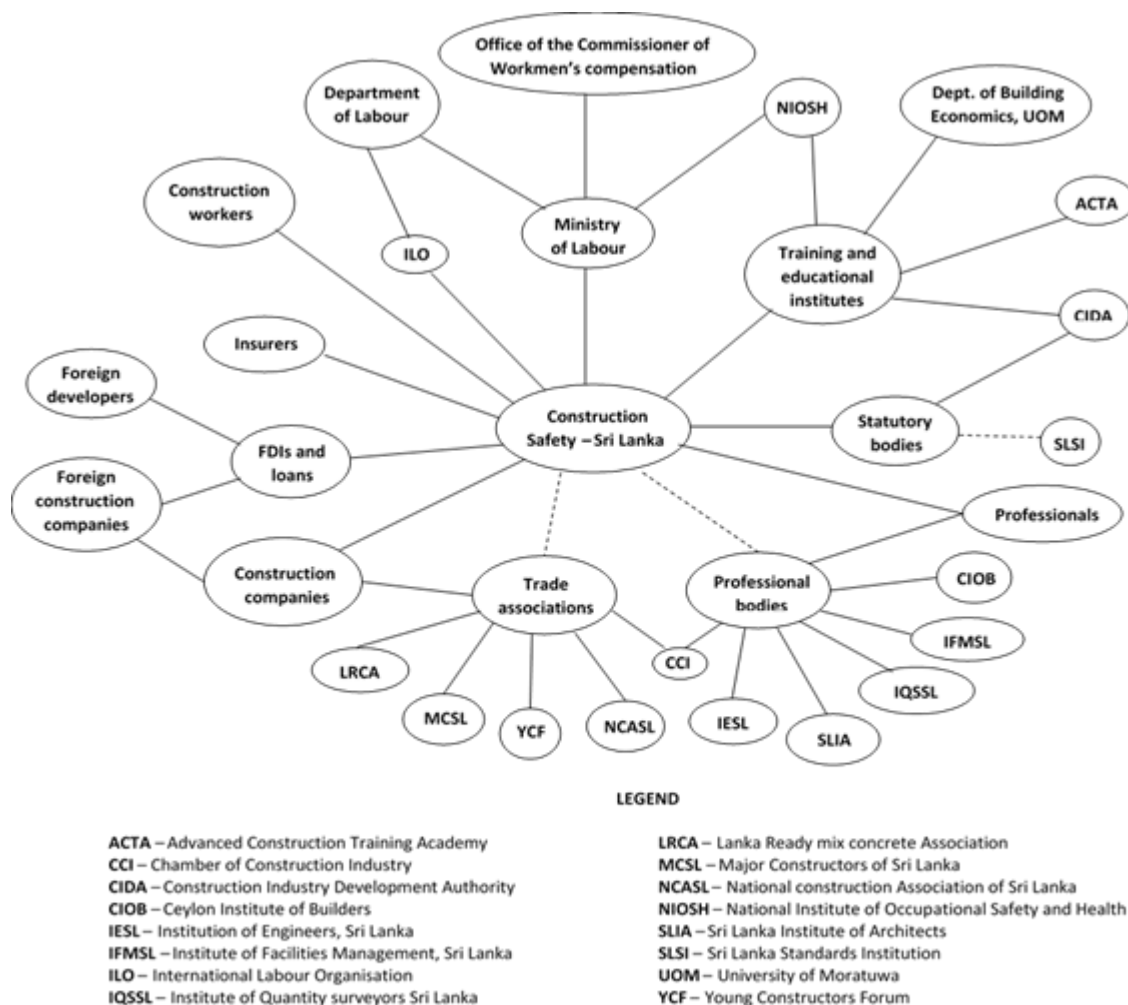


Figure 1: Inter-organisational structure of construction safety management system in Sri Lanka (The broken lines denote indirect influence of institutions on construction safety)

Based on the national and industry level regulatory, advisory, consultancy, educational, and training framework discussed above, Figure 1 illustrates the inter-organizational structure of construction safety management in Sri Lanka.

5.6. Stumbling blocks of construction safety management

The Factories Ordinance does not specifically cover issues of the construction industry, rather it addresses safe operating procedures of mechanical equipment, cleanliness of the factory and surroundings, and welfare of employees in all industries. It was put together more than seven decades ago and only a few minor amendments were made. None of the technological advancements and current requirements of industries are addressed. In terms of enforcement, District Factory Engineers do not carry out any scheduled or ad-hoc inspections on construction sites unless there is an accident occurred or complaints received. The Department of Labour does not have enough resources, both personnel and

others, to conduct inspections. According to the Department of Labour [44], only around 10% of the registered factories are inspected annually. Therefore, construction sites are always overlooked.

Currently, there is no adequate involvement in enforcing safe construction practices by CIDA. In January 2019, CIDA compiled a new health and safety guideline [45]. The “Guidelines for Construction Safety and Occupational Health in Sri Lanka,” would detail broad measures to ensure safety at construction sites. It was issued to the public for comments, but still not approved or enacted. The only procedure that helps in forming a safety management system for organizations is the construction company grading system. With the mandatory requirement of ISO 45001 to maintain CS2 and CS1 grading, construction companies develop their safety management system. Thus, no audits or inspections are conducted by CIDA, providing the certificate is adequate to obtain the grading.

CS2 and CS1 construction companies should have a Safety Manager, Safety Officers, and Safety Supervisors in their organizational structure. The usual practice is, that a Safety Manager is appointed for the organization who oversees all projects and resides at head office and each site has Safety Officers. Safety Managers are expected to have a diploma level qualification and Safety Officers require a certificate level qualification. Some organizations recruit facilities management graduates of the University of Moratuwa as Health and Safety Executives. This practice is common in foreign construction companies in Sri Lanka. Meanwhile, some companies appoint Supervisors and Technical Officers in the organization as safety professionals to fill the requirements imposed by the construction company grading system or the contract. Though they are experienced well in construction processes, it is not the right competency for the job.

For a CS2 company, there should be a Nurse to help with medical emergencies. But, in practice, a qualified Nurse is usually not recruited. If the Safety Officer has a certificate from Red Cross Society, the organization shows that he is competent for the position of Nurse. Also, the site should be equipped with a first aid room, a refrigerator, a stretch, and a skilled person to cope with an accident. But these are not practiced as prescribed, some organizations don't even provide basic first aid requirements at the site.

The lowest bid selection for projects also affects safety negatively. Even though the conditions are included to implement safety practices, construction companies will find loopholes, for example, if the project condition is to hire a Safety Officer with a diploma and 10 years of experience, the bidder inserts a lower amount for this item to win the project due to competitive bidding and recruits less competent personnel in the implementation phase.

It is evident that construction safety performance is at a very low level and is very poorly managed. There are multiple causes for this particular issue. There have been minimal changes to the regulatory system over seven decades since its enactment. Inadequate regulations, inadequate enforcement of existing regulations, ineffective governance, and administrative system, lack of attention and poor commitment of stakeholders, bidding strategy, inadequate safety standards, inefficiencies of the organizational structure and recruitment of safety professionals, and poor work ethics are the causes for ineffective safety management systems in construction organizations. As a result of these institutional issues, negative safety perceptions of managers, poor workers' attitudes toward safety, inadequate allocation of funds, lack of supervision, lack of training, lack of awareness and negligence are common in the organizational context. Cost is always prioritized over safety in organizations. So, pushing for production schedules, use of low-quality personal protective equipment, and recruitment of less competent professionals and workers are obvious. However, safety practices are progressed slowly compared to the status 20 years back. The exposure to positive practices of foreign construction companies operated since then is a reason for this progress. Many local companies have implemented safe practices by imitating foreign construction companies, thus it is marginal. To improve construction safety, necessary attention should be given to the above institutional issues.

6. Implications and future research

The enforcement mechanism of regulatory authorities including the Department of Labour and CIDA needs improvements. Industry-specific standards, guidelines, and codes of practices are mandatory to

boost awareness and highlight the gravity of safety. They should encourage a clear organizational framework that facilitates the implementation of an effective safety management system with a structure that clearly defines the duties and responsibilities of various organizational levels in all small, medium, and large construction companies. CIDA needs to introduce safety compliance criteria when awarding projects. In the bidding and contract documents, it would be necessary to add clauses on budget allocation for safety in the project. Then the construction company can claim that amount from the client by implementing suitable practices where spending is monitored by an independent third party of the project. Moreover, data on occupational accidents are very little and scattered, therefore, the industry requires an operational surveillance system to ensure accountability. Further, support from educational and training institutes, trade associations, and professional bodies is necessary to push forward the importance of safety.

This study only focused on Sri Lanka to identify the issues that dwelled within its institutional framework. Thus, comparing different countries will bring out further perspectives on why Sri Lanka is backward in construction safety management.

7. Conclusion

Construction safety in Sri Lanka has been an overlooked aspect for many years. In search of reasons for that, this study investigated the institutional framework of the construction safety management system. The governance and culture hold the industry back from continuous improvement. The organization of the stakeholders in the industry does not provide adequate support. The structure and registration of local construction companies also provide a barrier to any national concerted move to improve performance. The foreign investments and loans for capital projects bring in foreign contractors who do not share technology and management expertise with the local construction community.

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