

**SKILLED LABOR SHORTAGE IN THE
CONSTRUCTION INDUSTRY IN SRI LANKA**

**MASTER OF SCIENCE
IN
CONSTRUCTION PROJECT MANAGEMENT**

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SKILLED LABOR SHORTAGE IN THE CONSTRUCTION INDUSTRY IN SRI LANKA

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Declaration

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Abstract

The Construction industry is one of the largest industries in Sri Lanka. The skilled labor shortage is one of the main challenges that the industry is suffering. Although this is an important area of study, only a few research studies have been conducted.

The research aimed to investigate the causes for the skilled labor shortage in the construction industry in Sri Lanka and to propose suitable measures to minimize it.

A literature survey was conducted by referring to the available research studies. Causal factors for the skilled labor shortage, the negative impact of skilled labor shortage, and possible measures to attract and retain skilled laborers were identified during the literature survey.

The questionnaire survey was the primary data collection method of the study. Preparation of the questionnaire was done using the factors identified from the literature survey. The questionnaire was distributed among skilled laborers at building construction sites in Colombo which were carried out by construction companies with the highest CIDA accreditations for building construction.

Relative Importance Index (RII) was used for analyzing and ranking the factors. Based on the questionnaire survey results, most important nine numbers of causal factors were identified for the dissatisfaction of skilled laborers. Uncertainty of employment, Low pay compared to the bitterness of the job, and no clear career path and career development are ranked in the first three positions respectively.

Further, the most important seven numbers of changes that are expected by skilled laborers were identified. The top three expected changes are to increase day salary and overtime rate, allow to work more overtime hours, and introduce new technological equipment for site works and provide training for the same.

The outcome of the study can be used as a guideline to reduce the skilled labor shortage in the Sri Lankan construction industry.

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Chapter 01

1 Introduction

This chapter provides the details of the selected topic, the background of it, issues that are encountered with it, the reason for the chosen study, the purpose of the research study, outcomes of the research, and the methods utilized to achieve the outcomes. This chapter will also discuss the scope of the research and the research gap. This chapter will provide guidance and direction to the reader.

1.1 Overview of the Study

The construction industry is very important in the development of the economy in Sri Lanka. It is the second largest industry in Sri Lanka as a percentage of GDP (Annual Report of Central Bank - Sri Lanka, 2017). The construction industry is expanding rapidly following the end of the 30 years of civil war (Fernando, Fernando, and Gunarathna, 2016). There has been a large number of investment projects in Sri Lanka with the end of the civil war such as high-rise buildings, highways, roads, ports, water sector projects, etc.

Along with the development of the construction industry, there are a lot of challenges and difficulties to overcome. There is a requirement to upgrade the construction with effective and efficient construction management practices to overcome those challenges and difficulties.

The construction industry is an industry that is considerably dependent on the performance of skilled laborers.

Skill can be defined as the ability to carry out tasks and duties of a given job. Skilled labor refers to labor that requires workers who have specialized training or a learned skill-set to perform the work (Noh, 2017).

Construction time, cost, and quality depend on the performance of the skilled laborers. Although new technologies have been introduced into the construction industry, skilled laborer plays a big role in the successful completion of a construction project.

Most of the construction projects end up with delays and cost overruns due to various reasons.

Shortage of skilled labor is one of the reasons for time and cost overruns of construction projects. One of the challenges in the construction industry is a lack of skilled personnel.

Manpower requirements in the construction industry fluctuate with the availability of construction projects. The availability of construction projects highly fluctuates from time to time. Due to this matter labor demand highly fluctuate. Construction companies have difficulties to maintain a permanent labor force with them due to the fluctuation of demand. Hence most of the construction companies recruit laborers on a short-term basis (Jayawardane and Gunawardene, 1998).

In both developed and developing countries competition between contractors has increased. Sub-contracting and self-employment are also two elements that have increased. Since the construction workers are hired on a project basis, the construction industry is characterized by a pool of local workers who work for a variety of contractors in different branches of industry such as industrial, residential, non-residential, and heavy construction. Contractors employ workers from the labor pool when they are required. Hence, manpower planning and training can no longer be expected from contractors. This results in poor quality, high wastage, and long-term productivity decline in the industry (Jayawardane and Gunawardene, 1998). These are a few issues that exist within the construction industry labor force.

There is a huge demand for skilled laborers in the construction industry.

Although there are many career opportunities available in the construction industry most young people are not attracted to the construction industry.

Most people believe that there are better career opportunities other than the construction industry. Although the other career opportunities may not pay high wages in contrast to the construction industry, many individuals are attracted to careers in other industries due to reasons such as reputation, family environment, health insurance, lower work bitterness, etc.

The Sri Lankan construction industry consists of an informal and unsystematic labor force. This encounters a lot of issues when completing the construction projects within the given budget and timeframe to meet the required quality standards.

In order to solve the issues of the skilled labor shortage and to support the development of the construction industry, it is required to research the field of construction management practices within the construction industry.

1.2 Justification of the Research

Although researching the field of a skilled labor shortage is important, there are only very few research studies recently done on the topic due to various reasons.

In Sri Lanka, there are also very few studies conducted on the topic of skilled labor shortage in the construction industry. In most of these studies, data collection has been done through a questionnaire survey filled by a supervisory staff of the skilled laborers such as engineers, project managers, quantity surveys, etc.

Real problems that are skilled laborers face can only be identified by collecting information from skilled laborers themselves. The type of changes to be expected within the construction industry by them can also be identified by collecting first-hand data from them.

Although few studies have been done, skilled labor shortage does exist in the Sri Lankan construction industry.

Most people are not attracted to the construction industry due to various reasons.

This study is to propose suitable measures to reduce the skilled labor shortage in the construction industry.

This is a needful study in Sri Lanka for the development of the construction industry.

1.3 Objectives of the Study

Objectives of the study are:

- To Investigate the causes of skilled labor shortage in the construction industry in Sri Lanka
- To Propose suitable measures to minimize the skilled labor shortage in the construction industry in Sri Lanka

1.4 Research Design and Methodology

A literature survey was conducted to study the findings from previous studies such as reasons for the skilled labor shortage, available mitigation measures, available research methods, etc.

Data collection for this study was done through a questionnaire survey which was conducted among skilled laborers.

When considering the size of the population for the study, due to limitations of the available resources, it is impossible to collect data from the entire population. Hence, a particular sampling technique was used to select a representative sample from the population.

Data analysis was done using a ranking method in order to find the solutions according to the objectives.

1.5 Scope & Limitations of the Research

The given study was conducted among the building construction projects in Colombo which are carried out by contractors who have CIDA registration CS2 in the field of building construction.

The collection of data was limited to the aforementioned scope due to the limitation of the available resources.

During the data analysis, it was observed that most of the skilled laborers on sites are not working under main contractors. Hence, results observed during the research may not fully represent the above companies. Most of the sub-contractors are working under several main contractors. Hence these results may be applicable to other construction companies as well.

The study was done with the participation of Sri Lankan skilled laborers only. Issues that foreign skilled laborers face while working in the Sri Lankan construction industry may differ from the outcomes of this research study

1.6 Thesis Breakdown Structure

Literature review is included under chapter 2 of this report. The chapter includes the research conducted on skilled labor shortage within the field of the construction industry. This chapter includes the details of research studies done in Sri Lanka as well as other countries.

In chapter 3, the research methodology is explained in detail. The way that the research was carried out was mentioned.

Results and discussion from the research are given in chapter 4. This chapter includes the details of the problems or difficulties faced by skilled laborers at construction sites as well as the changes that are expected by skilled laborers.

Chapter 5 consists of the conclusions of the research and recommendations for future research studies.

1.7 Summary

This study provides some valuable insights into the skilled labor shortage that exists within the Sri Lankan construction industry. This study includes the reasons for the skilled labor shortage, suitable measures to reduce the skilled labor shortage in the construction industry.

This research can be considered as needful research for the development of the Sri Lankan construction industry.

Chapter 02

2 Literature Review

2.1 Introduction

This chapter includes various discoveries, information, and thoughts that have been set up on this subject, their merits and demerits, and an assessment of various previous literature with various hypotheses and discussions on the research area. This will direct how early research studies have been done.

This chapter includes the details of research methods, findings regarding causes for the skilled labor shortage, impacts caused by these causes, possible mitigation measures, and strategies to attract and retain skilled laborers in the construction industry.

2.2 Issues Available With the Skilled Labor Shortage and Mitigation Measures

Silva, Rajakaruna, and Bandara (2005) have conducted research on the challenges of the Sri Lankan construction industry. They have highlighted high labor turnover, skill shortage is among the main challenges that the construction industry faces. A major component of the skilled laborers in the construction industry has not been received systematic training. Only less than 4% of the skilled laborers have been undergone systematic training and holds a certificate for their skills. There are various reasons for that. Lack of training provided by organizations, lack of suitable short skill development programs, and lack of interest shown by the laborers are some of them.

Some researchers have used significant index and important index to summarize the research findings.

Praveen et al (2010) have identified & ranked sixteen causal factors for shortage of skilled labor according to the views of involved parties and according to the employment type.

They have identified eleven effects to construction projects due to a shortage of skilled labor. Those effects are also ranked according to the views of involved parties and according to the employment type.

During the study, nine mitigation measures were identified and those were also ranked based on the same principle.

When considering the ranking depending on the type of employment and involved parties, they have summarized five causal factors, five effects, and five mitigation measures.

Those results are given below:

Causal Factors

- 1.0 Trained workers passing out from the training institutes and join with the industry is lesser than the industry demand
- 2.0 Since most of the laborers are not with permanent employment with contractors, they are not investing in the training of laborers
- 3.0 Availability of training facilities are not sufficient
- 4.0 Most of the laborers are in search of foreign employment for higher wages
- 5.0 Difficulties in finding suitable laborers with sufficient skills

Effects on Construction Industry due to Shortage of Skilled Labor

- 1.0 Time overruns
- 2.0 Cost overruns
- 3.0 Difficulty to read and understanding construction drawings
- 4.0 Labor productivity is low
- 5.0 Wastage of material due to inappropriate handling

Mitigation Measures

- 1.0 Increase salary/wages (to mitigate foreign employment)
- 2.0 Increase no of admission to training institutes in order to increase skilled labor supply
- 3.0 Maintaining a skilled permanent labor pool with the company and invest in their training
- 4.0 Introducing proper skill evaluation and grading system in order to encourage laborers to enhance their skills

5.0 Encourage contractors to maintain permanent skilled labor gang with them by demonstrating the potential benefits of the same

Zaki, Mohamed, and Yusof (2012) have done research on skilled labor shortage in Malaysia. The reasons for the skilled labor shortage from their findings are highlighted below.

- 1.0 Economic factors (Rapid development increased construction projects and this leads to shortage due to high demand)
- 2.0 Lack of training and skill formation
- 3.0 Poor image of Construction Industry
- 4.0 Sub-Contracting System
- 5.0 Poor Site Accommodation and services
- 6.0 Unattractive jobs and insecure career path

Sharma, Oczkowski, and Hicks (2016) have carried out studies on skill shortage in regional Australia. They have done modeling of the extent of skill shortages, strategies for addressing hard-to-fill vacancies, consequences of hard-to-fill vacancies. According to their study, large firms are willing to recruit skilled workers from overseas and continue to look for workers over-time to fill vacancies. They highlight that large firms are the best place to minimize the commonly encountered negative consequences of skill shortage.

Watson (2007) has done studies about the skill shortage in the Australian construction Industry. According to their study, investment in the education system and skill training is not sufficient, lack of admissions for the training programs, an increase of the elderly population, the gap between demand and supply of skills, lack of training courses to cater to the demand of the industry, low-level education of migrants are main reasons for skill shortage in the construction industry in Australia.

Mackenzie, Kilpatrick, and Akintoye (2000) have done studies on the UK construction skill shortage. They highlight seven no of systematic plans. Skill Certification system, providing equal training opportunities via regulatory bodies, more investment on skills, introducing construction week, trainee recruitment via training regulatory body, Careful construction plan and new employment plan are those highlighted points.

Further, they highlight nine no of alternative action plans. Attract women and racial minority for the workforce, adult people for the workforce, increase direct intake by contractors, increase the providing of training by contractors, introducing long term plans on construction training, use new technologies, improve the workload and economic stability in the field of construction, automation, and prefabrication of sites are those points.

Paul (2016) has done studies on skilled labor shortages in the construction industry in Hong Kong. He has identified practical strategies to mitigate the skilled labor shortage. They are, increasing worker salaries and reimbursements, provide training opportunities to newcomers with the collaboration with contractors, providing sufficient training allowances during the training period, import foreign laborers to fulfill the labor requirement, try to introduce alternative worker sources such as women, national minorities, introducing new technology and new equipment to increase the productivity, make better working environment by enhancing safety, health and welfare facilities, the establishment of skilled labor carrier path, encourage long-lasting employment with construction companies, introduce and practice multi-skilled worker concept, development of action plans to fulfill future labor demand with the collaboration of stakeholders such as government, schools, training institutes, and construction companies.

Hamid, Singh, and Mazlan (2013) have done studies on the construction labor shortage in Malaysia. They have found the current shortage of workers, problems faced by contractors when hiring laborers, methods used by the contractor when acquiring construction workers, and strategies taken by the contractor to overcome the shortage of labor. Method of acquiring laborers and strategies taken by the contractor are relevant factors that can also be considered in terms of the Sri Lankan construction industry.

They have highlighted the below methods in acquiring construction laborers.

1. Direct intake from labor agents
2. Through sub-contractor methods
3. Gains from sub labor parties
4. Applies from Department of the labor force
5. Obtain labor from CLAB

6. Direct intake(Advertising in mass media)
7. Application through the Malaysia construction academy

Given below are the strategies taken by contractors:

1. Borrowing laborers from other contractors
2. Rescheduling work and resources leveling accordance labor resource available
3. Instruct laborers available to work overtime
4. Instruct laborers to work on holidays
5. Introduce multiple shifts work system
6. Increasing the number of the machine or machinery to accommodate the shortage of labor
7. Adopting new technologies like precast formwork system or precast concrete
8. Concentrating more on critical activities
9. Maximize used/fully optimized use of labor available
10. Hiring labor that having multiple skills

Windapo (2016) has researched the skill shortage in the South African construction industry. He highlighted that poor image of the construction industry, standards, and appropriateness of training courses, fluctuation of labor demand, elderly workforce, and development of technologies, economic conditions are some of the influencing factors for the skills shortage.

Agapiou, Price, and Mccaffer (1995) highlighted that the wages of skilled laborers in the construction industry are high compared to other industries. But due to various reasons, people are not joining the industry. Some of the reasons for them are lack of carrier path and poor image regarding the construction industry.

When considering the salary and wages of the Sri Lankan labor force, construction industry skilled laborer's wages are comparatively higher than other careers.

According to Statistics (2019), mean and median monthly gross salaries by major industry groups are as follows.

Table 1 - Mean and Median Monthly Gross Salary by Major Industry Groups

(Statistics, 2019, p.19)

Measurement	Agriculture	Industry	Service
Monthly wage/salary earners (Rs.)			
Mean	21,852	35,672	43,378
Median	18,500	28,000	35,800
Daily wage/salary earners (Rs.)			
Mean	19,345	28,521	25,317
Median	16,000	25,500	22,500

Construction industry workers are included in the “industry” category of the above table. The industry sector consists of construction, mining and quarrying, manufacturing, electricity, gas, steam and airconditioning supply, water supply, sewerage, waste management, and remediation activities.

The wages of the construction industry skilled workers may be higher than the mean value of the industry category as well.

When considering the day pay workers, the mean and median of the industry sector wages are higher than agricultural and service sector workers.

Silva, Warnakulasuriya, and Arachchige (2018) discussed skill shortage and skill mismatch. They mainly highlighted the main sixteen numbers of causal factors and sixteen mitigation measures for skill shortage in the construction industry. They highlighted that these causal factors should be classified as company-level causes, industry-level causes, and national-level causes. For each level of causes, different approaches to be used to address them.

These causes may result in another subset of causes such as people migrate for high expectations/living standards, government encouragement for foreign employment, etc.

During the discussion of the study, they highlighted that in order to solve the issues of skill shortage construction firms need to follow proper action plans. Because construction face difficulties of attract, train and retain workers.

They have highlighted, the importing of foreign labor is an easy and speedy solution for the skill shortage. But allowing foreign workers will generate many issues such as economic issues, political and social issues if foreign workers do not manage properly.

It is required to follow proper action plans to improve the brand image, to improve training arrangements, and to retain employees in the construction industry.

Jayawardane and Gunawardene (1998) have carried out studies on Sri Lankan construction workers and revealed that due to lack of full-time employment skilled labor force is not fully utilized. Over 80% of the skilled workforce is informally trained and a large percentage requires further training. According to their view, training programs preferably should be on a part-time basis and strategies should be identified to encourage existing workers to enroll.

Chini, Brown, and Drummond (1999) have done studies on causes and proposed solutions for construction industry skill shortage. They have highlighted economic change, technological change; union/open shop changes, educational changes, and image are some of the causes for skill shortage in the construction industry.

They have highlighted some of the possible solutions for the skilled labor shortage. They have divided them into two sections; short-term solutions and long-term solutions.

As short-term solutions they highlighted, that necessary steps should be taken to retain the existing labor force such as providing a bonus, overtime opportunities, loyalty rewards, and promotions. They suggested a concept called labor sharing between small contractors.

For long-term solutions, they suggested, conduct awareness programs at high school levels to attract school leavers to the construction industry, a natural progression after primary education. This will lead post-high school classes into the votech/apprenticeship programs.

Oseghale, Abiola-Falemu, and Oseghale (2015) have done studies on skilled labor shortage in selected construction firms in Edo state, Nigeria. They have ranked the causes for the skilled labor shortage and they are; no clear career path, high mobility of construction workers, low wages, diminishing craftsperson training program, Growth of self-employment, dissatisfaction with labor organizations, introducing new

technologies, ethnic characterization, poor safety of construction work and poor image of the industry.

They revealed some of the effects of the skilled labor shortage are paying extra money for labor, schedule delays caused by a labor shortage, and cost overruns.

Jayawardane and Gunawardene (1998) have done studies on the training requirements of the Sri Lankan construction industry. They revealed that current training programs inadequate to the skilled labor requirement in the construction industry. Enrolment of trainees to existing training facilities/centers raises another issue with respect to the demand for training among unskilled workers. Unskilled workers could be considered potential candidates for the existing craft-level courses. When there is a high demand for training among these workers, the lower level of intake for craft-level courses is something worth investigating. Factors influencing such a situation may be due to lack of training facilities/programs, the geographical location of training centers, financial sponsorship, educational qualifications, and reluctance to leave the present occupation due to financial hardships.

Barrett, Hanna, and Ullah (2014) have done studies to rectify the skill shortage in the construction industry in the UK. According to their study, the government needs to introduce conditions regarding requirements of employment in public contracts, regulation to be changed to allow trainees to travel across administrative divisions to get training, funding system to be implemented for providing career advice to school children, part of the evaluation of schools based on the success of training programs of schools, training programs to be changed according to the industry demand and government need to check the impact of above changes are some of them.

Zaki, Mohamed, and Yusof (2012) have carried out studies on skilled labor shortage in the Malaysian construction sector. They also highlighted the similar facts that are highlighted by other researchers. According to their findings, the fast growth of industrial activities has increased skilled labor demand. Training authorities are unable to provide a sufficient number of skilled laborers. There are various reasons for it. The skill supply system needs to be flexible to provide sufficient labor for the changing requirement. They discuss a comparison of the training systems available in Malaysia. There are two types of systems; National Dual Training System (NDTS) is one of them.

National Occupational Skills Standard (NOSS) is the other system. NDTS is the newly introduced system to fulfill the skill requirement in the country more practically to match with the skill requirement of the country.

NDTS is a training program. Involve parties of it are government, skill development department, employers, construction companies and participants for the courses. During the training period, the employer will provide an allowance for trainees. A certificate will be awarded at the end of the successful completion of the program. The certification is known as “NDST k-worker certificate”

Nwaogazie, Augustine, and Henshaw (2016) have conducted research on multi-skilling in the construction industry. Multi-skilled labor means a labor that has full competency in one particular field and having some extent of competency in some other fields. A worker who has multi-skills has the flexibility to work on different categories of jobs in one or more projects in the same company. This allows to reduce the labor cost of the project as well as to reduce the number of workers in the workforce.

Carley et al, (2003) have done research studies on multi-skilling. They highlighted that a multi-skilled workforce can improve labor retention. Since they can work on multiple trades they can earn comparatively higher amounts than others. Contractors can assign multiple jobs to them. Multi Skilling reduces the idling periods also. When there are no more works available in their primary field at sites they can work on other fields also. This improves job security and continuous employment with the company.

During their study Nwaogazie, Augustine, and Henshaw (2016) have selected a sample project and have done project labor cost analysis based on multi-skilling and normal labor conditions. They have identified that multi-skilling can save up to 30% of project labor costs.

Burleson et al (1998) also conducted research studies on the multi-skilled labor in the construction industry. They also highlighted some benefits of multi-skilled labor and there are some barriers to implement this. To utilize multi-skilled labor strategy employers must alter their screening and hiring practices, compensation practices, staffing practices, and project management practices.

According to their study, the availability of training and nationally standardized training curriculums is an issue that will impact the uniform application of multi-skilling strategies. More flexible systems will be needed to manage a multi-skilled workforce in non-maintenance construction sectors.

Jie and Zhu (2011) have researched the “Labor Contractor” in the construction industry in China. They highlighted that there are advantages as well as disadvantages of labor contractors. Some of the advantages are easy to manage, lower cost, easy to deploy, lesser no of facilities to provide by the company, etc.

Most of the foreign laborers have difficulties getting direct employment with contractors due to various reasons. There are a lot of barriers to doing so. Availability of labor contractors prevents foreign workers from getting engage with direct employment with the contractors. Foreign workers enter into the employment agreement with labor contractors and indirectly work for the main contractors.

Foreign workers have very little information regarding finding suitable employment. Since labor contractors have the knowledge they work as the link between contractors and foreign workers. Labor contractors can provide required technical knowledge to the foreign laborers and provide the required assistance. Hence labor contractors help to fill the labor market gap.

There are some disadvantages of labor contractors are available in the construction industry in China. Some of the disadvantages are given below. There may be similar impacts from labor contracts to the Sri Lankan construction industry.

Inadequate skills and competency of workers, lack of knowledge and training on safety, team management difficulties, not having specialized in the required work category are some of them. These disadvantages may create a lot of negative impacts on construction projects.

Since the ability to risk resisting labor contractors is low they have to face financial issues and sometimes they deduct wages they pay to foreign workers.

Due to the availability of labor contractors, main contractors do not maintain a permanent labor force under them. This has become a barrier to the development of the construction labor force. This applies to the Sri Lankan Construction industry as well.

Most of the main contractors are not maintaining a permanent labor force under them. Instead of that, they are practicing a sub-contracting system.

During their study, they have proposed some methods to solve the issues discussed above. Some of them are, improvement of rules and regulations to remove the barriers to getting direct employment with contractors, improvement to the labor market, strengthening market management, etc.

Han et al (2008) have conducted studies on main issues and feasible solutions to motivate foreign construction laborers in the Korean construction industry. In some countries, there are policies to prohibit legal foreign workers to protect domestic laborers. But with the high demand for construction workers, many countries have changed their laws and regulations to allow foreign workers to legally employ with certain limits and regulations.

During their study they have revealed there are several critical problems with the foreign workers such as low productivity of foreign labor, increased rework cost due to bad workmanship, cultural issues, not following the instructions of the project manager or supervisors, increased number of accidents, increase cost and more difficulties to handle foreign workers, the difficulty of having a continuous supply of foreign laborers due to regulations, racial discrimination, laborer escape from construction sites are some of them.

They have identified factors that result in the low performance of foreign laborers. They mainly categorized those under three sections. Those are impractical rules, regulations, and policies introduced on foreign laborers, qualification, competency, and personality issues of foreign laborers, and site management systems issues.

Impractical rules, regulations, and policies include sub-factors of lack of transparency of the process, delays in providing decisions and response from government bodies, the complexity of rules and regulations.

Qualification, competency, and personality issues of foreign laborers include sub-factors of lack of technical knowledge, lack of personal characteristics, low skill levels, malpractices of work style, and disputes with customs and culture of the country.

Site management system issues for foreign laborers include sub-factors of insufficient welfare facilities, insufficient wages, and reimbursements, poor work environment, issues with the training and evaluation systems, the ineffectiveness of the policies of human resource management.

During their study, they have highlighted practical manpower management skills to improve foreign worker performances. Flexible employment systems for foreign workers, education and training programs for communication, implementation of an evaluation system, organizing teamwork system, and well-planned welfare program for better working conditions are some of them.

Abdul-Rahman et al (2012) have done studies on the negative impacts of foreign workers in the Malaysian construction industry. According to their study, foreign construction workers in Malaysian construction will solve the skilled labor shortage. But there may be a lot of social issues due to them.

According to their study construction industry of Malaysia consist of laborers from Indonesia, Bangladesh, Thailand, Philippines, Pakistan, Myanmar, Nepal, and Vietnam.

Some of the identified negative impacts are too much dependence on the foreign laborers, local labor further unattached to the industry, lesser technology development, and poor quality of work, increase criminal activities, economic factors, and illegal migration.

During their study, they have proposed solutions to minimize negative impacts which were occurred due to foreign laborers. Those solutions are, attract more local laborers to the industry, introducing and promoting industrialized buildings, introducing a levy system, prevent illegal migrant laborers, and change migration policies.

Agapiou, Price, and Mccaffer (1995) have done studies on labor resource issues in the UK. During that period also image that the younger generation is bearing regarding the construction industry is poor. They believe that employment in the construction industry is dangerous, dirty, having lesser carrier development, and have lower social recognition. Improving the image of the construction industry will change the mindset of the younger generation and will be able to attract more youth to the construction industry.

During that period also highlighted that the labor subcontracting system is growing and it reduces the provisions for training of the construction workforce. This has reduced direct employment as well.

They have highlighted reasons for discouraging to conduct trainings for laborers through industry training organization.

Those are existing classroom-based training arrangement are not matched with the requirements of small businesses, construction companies cannot afford the time required for training, the commitment of the younger generation is less, industry demanded training courses are not available, investment in training is useless because trained people move for other jobs for higher salaries, cost of the training programs are high, modules of training colleges are outdated and not updating according to the latest technology and methods.

2.3 Negative Impacts of Skilled Labor Shortage in Construction Industry

Hossein et al (2018) have done studies on the impact of skilled labor availability on construction project cost performance.

They have highlighted the main reasons for cost overruns due to skilled labor shortage. Some of them are productivity loss, an increase of overtime hours, the requirement to increase hourly pay rate, idling hours due to accidents, increase of rework cost due to bad workmanship, and cost overruns due to schedule delays.

During their study, they revealed that the productivity of laborers can be increased by 13-18.7% when competency is increased. At the same time when it is difficult to find sufficient competent laborers for the project, its productivity is automatically reduced. This leads to project cost overruns.

According to their study projects which are suffering from skilled worker shortage have difficulties achieving project goals such as time targets, budget targets, and quality targets. In such projects, overtime scheduling is required to meet the project deadlines. This will reduce the cost performance of the project.

They revealed that construction sites that are suffering from skilled labor shortages have a higher number of accidents. When labor scarcity increases the number of

accidents also increases. When the number of accidents increases in a project, it has an automatic adverse effect on the project cost performance as well as project time performance. When major accidents occur there are some instances where projects have to be terminated temporarily until required investigations are completed and necessary legal actions are taken. This will increase project duration and will create cost overruns.

Further, they revealed that when it is difficult to find a sufficient number of laborers with the required competency, it will increase the cost of resources such as additional labor, equipment, and materials, etc.

Finally, they have discussed that skilled labor shortage in construction projects directly affects the quality performance of the project. This will increase the rework cost of the project. As explained in their study, the most influential factor for increase rework cost are lack of know-how of supervisors, inadequate training and knowledge of them, not following better work procedures, and no sufficient supervision.

Oke, Aigbavboa, and Khangale (2018) have conducted studies on the effect of skills shortage on sustainable construction. In their study, they have highlighted the increase in costs, delays, reduce quality, higher accidents rates, more rework, low productivity, increase in the cost of production, reduction in organization's competitiveness, enterprise failure, decrease in the size of the construction labor sector, rise in construction workers' pay is the main impacts of skills shortage in the construction industry.

Bilau et al (2015) have researched the review of the shortage of skilled craftsmen in small and medium construction firms in Nigeria. They revealed that Nigerian construction firms have difficulties in organization's productivity, quality of work, duration of projects, and on firm's profits due to the skilled labor shortage.

Sweis, Sweis, Hammad, and Shboul (2008) have carried out studies on delays in construction projects. During their study, they have ranked skilled labor shortage as the third most important delay factor according to the views of contractors. According to their study, manpower shortage, skilled, semi-skilled, and unskilled, has been a serious delay cause for residential construction projects in Jordan.

2.4 Strategies to Attract and Retain Laborers in Construction Industry

Dainty, Json, and Root (2004) have carried out studies to identify strategies to attract workers to the construction industry. They have highlighted few strategies. Better promotion campaigns to promote the construction industry, use advanced technologies for effective manpower planning, necessary actions for workforce development are some of them.

Fiori (2003) has done studies about how the image and diversity issues of the construction industry affect the shortage of skilled labor. According to their survey, there was a nationwide survey to define career interests among high school students and their parents. During the survey construction industry ranked in 498th position out of 500. It's clear that construction is not an attractive career opportunity for most of the youth all over the world.

Some researchers have conducted their studies on how to attract, engage and retain skilled laborers to the construction industry. According to Manap, Mohd Noh and Syahrom (2017) lot of contractors have reported that there are difficulties in recruiting suitable local skilled workers in Malaysia. Reasons for the same may be unfavorable working conditions, uncompetitive salaries, issues with the recruitment policies, mismatch of the skilled labor available areas, and job opportunities available areas.

They highlighted five suggestions to enhance the attraction of skilled laborers to the construction industry. Those suggestions are:

- 1.0 Salary Increment
- 2.0 Increase overtime payments and other allowances
- 3.0 Providing Bonus
- 4.0 Upgrade/Improve Laborer's Welfare
- 5.0 Provide Accommodation

Kim and Philips (2010) have conducted investigations to check the impact of health insurance on the retention of workers in the construction industry. During their study they discussed two concepts; Job lock and Industry lock. Industry lock means retaining laborers in the construction industry. Job lock means retaining laborers at the same construction company.

They discuss two types of health insurance; portable and non-portable health insurance. Portable health insurance provides facilities to change their employer without losing the insurance coverage. This reduces the job lock but keeps the industry lock. In the non-portable health insurance, the worker doesn't have that facility. This increases the job lock.

Bartlett (2007) has done studies on recruitment and retention in the construction industry in South Florida. He highlighted that in order to increase no of recruitments to the construction industry there are some improvements to be done. Some of them enhance the image of the construction industry and conducting awareness programs to highlight career opportunities in the construction industry. This will help to attract young people to the industry.

This can be done by joining with local schools and creating awareness programs that make students suitable for the construction industry. That will help to fill the gap in the industry by attracting a younger workforce.

He discussed the training programs in construction and highlighted that many people drop out from the training programs due to low pay during the training period.

Further, he highlighted that most of the training programs are outdated and those programs are not fulfilling the industry requirements. It is required to update them with the industry demand as well as the modern technology.

He highlighted the solutions for retaining in the construction industry are an increase in wages and other incentives, reducing of work demand through the implementation of automation and technology, create safe and pleasant working conditions, etc.

Smithers and Walker (2000) have carried out studies on how the workplace affects construction professional motivation. Some of the findings in the research may apply to construction workers as well. They have done a study in the construction industry in Melbourne, Australia.

They have highlighted bad organizational principles, not receiving appreciation for work, difficulties of the job, criticisms, has to do other works than job role, need for travel between workplace and resident area, long working hours, time to the time change

of work sites, isolated from the family and society are some of the demotivating factors in the construction industry in Melbourne, Australia.

Further, the aforementioned factors were discussed in detail.

Construction workers may not have sufficient time to spend on their responsibilities other than the job role such as social and family activities etc. due to long working hours. Due to this reason, they may have to face a lot of issues from the family as well as society. This may increase their demotivation.

Most of these factors are applicable to the Sri Lankan construction industry as well.

Brandenburg, Haas, and Byrom (2006) have done studies on strategic management of human resources in construction. According to their study, there are only a few systematic manpower management programs available in the construction industry. Most of the development programs are conducted on-the-job basis with limited resources. That will not properly improve the performance of the workforce. It is required to practice a proper manpower management approach to manage the skilled labor force effectively regardless of the skill level of the workforce. According to their study, the skilled labor shortage experienced by the construction industry will continue if the proper methods are not used to solve the problems of the skilled labor force. This study has conducted in 2006. The construction industry still suffering from the shortage of skilled labor force.

Smither (2003) has done studies on “Managing employee life cycle to improve labor retention”. He highlights that there are four phases in the employee life cycle. They are the introduction phase, growth phase, maturity phase, and declining phase. Each phase of the lifecycle should be managed properly in order to get the maximum output from the employee and retain employees at the organization.

Fellini, Ferro, and Fullin (2007) have done studies on the recruitment process and labor mobility in the European construction industry. In their study, they discuss the employment of foreign workers in the construction industry. They have identified four different strategies that construction companies can adopt to recruit foreign workers:

1.0 companies can recruit foreign workers already present in the country to work on national construction sites

- 2.0 companies can recruit foreign workers directly abroad to work on national construction sites
- 3.0 companies can subcontract to national small companies that employ foreign workers already present in the country or to foreign companies that bring their workers from abroad to construction sites
- 4.0 Companies can recruit foreign workers directly on-site and dispatch them internationally through their internal labor market

Although most of the studies mentioned above are carried outside of the Sri Lankan construction industry, most of the factors highlighted above are directly related to the Sri Lankan construction industry.

2.5 Previous Study Research Methods

There are different research types available. Descriptive research, correlative research, or exploratory research are some of them. To identify a suitable research type to address the issue, the researcher needs to have a clear idea of the research problem, basic knowledge of it, and research purpose.

Research studies need to be carried out according to a logical and valid method. Arguments and evidence in the research should be valid and logical. In order to do so there should be proper data collection methods.

Details of the available research methods on data collection, sample selection, questionnaire design, and data analysis are included in chapter 03 of this thesis.

2.6 Justification of Research

Although researching the field of a skilled labor shortage is important, there are very few research studies recently done on the topic due to various reasons.

In the Sri Lankan context also there are only very few studies have been done on the skilled labor shortage in the construction industry. In most of these studies, data collection has been done through a questionnaire survey filled by a supervisory staff of the skilled laborers such as engineers, project managers, quantity surveys, etc.

Real problems/difficulties which are faced by skilled laborers can only be identified by collecting the information from skilled laborers themselves. The type of changes to be expected in the construction industry are expected by them also can only be identified by collecting information from them.

Although there are a few research studies available, a skilled labor shortage does exist in the Sri Lankan construction industry.

This study is to propose suitable measures to reduce the skilled labor shortage in the Sri Lankan construction industry.

This is a needful study in Sri Lanka with the development of the construction industry.

Chapter 3

3 Research Design and Methodology

3.1 Introduction

This chapter includes the details of the research method conducted in order to achieve the objectives of the research. This includes brief details of the selected research method on data collection, sampling, questionnaire design & data analysis method. Further, it includes details of scope, limitations of the research, and justification for the selected research methodology.

3.2 Research Method Used for This Study

3.2.1 Research Strategy

The main focus of this research study is to investigate the causes of skilled labor shortage and to propose suitable measures to minimize the skilled labor shortage in the construction industry in Sri Lanka. Causes for the skilled labor shortage and mitigation measures were studied from the available research studies in Sri Lanka as well as other countries. There are limited research studies that were conducted in the Sri Lankan construction industry. Various types of research strategies have been used in those studies.

According to the literature survey, two types of research approaches are available. They are called “quantitative research” and “qualitative research” (Naoum, 2007).

3.2.1.1 Quantitative Research Method

The quantitative research method has characteristics of fewer biases, the decision made based on the facts, influence is less on personal feelings, etc. This type of study mainly involves the solving of problems with the involvement of numbers, theories, hypothesis testing, etc. Analysis of the data is mainly done through statistical analysis methods (Naoum, 2007).

This method is mainly involved with the statical data collection from a selected sample while explaining a specific phenomenon.

Followings are some of the important features of quantitative research

- Data collection is done according to a structured system such as a questionnaire, various tools such as computer software
- Results are derived from a large representative sample from a population
- High reliability can be expected
- The study consist of well-defined objectives and data collection done in order to get the objective answers
- Research is well planned before the data collection
- Data analysis is done with statistical analysis tools and results are presented in graphs, tables diagrams, etc.
- A research study can be used to illustrate relationships with various reasons, to predict results based on the available data

3.2.1.2 Qualitative Research Method

Qualitative research has more subjective characteristics. There are mainly two types of qualitative research strategies are available. Those are exploratory research and attitudinal research.

When the available knowledge about the topic is limited, exploratory research can be used. Data collection is mainly done through interviews. The main objective of the research is to get more clarity and a clear statement regarding the research problem. A questionnaire prepared for this type of research mainly consists of questions that expect explanation-type answers.

Attitudinal type of research is used to get the view or opinion of a person on the subject matter.

Followings are some of the important features of qualitative research

- The nature of the collected data is deeper and rich
- The sample size is comparatively lesser than the quantitative method
- Data collection questions consist of more open-ended questions
- There is a close relationship between the researcher and the research subject

3.2.1.3 Triangulation Method

According to Fellows & Liu (2008), two or more research strategies can be used in the triangulation method in order to solve the research question. Disadvantages that are available with each quantitative and qualitative strategy can be eliminated when a combination research method is used. Both qualitative and quantitative data can be collected in this method. Flow diagram of data collection, data analysis, and expression of results, conclusion, and recommendations is shown in the below figure.

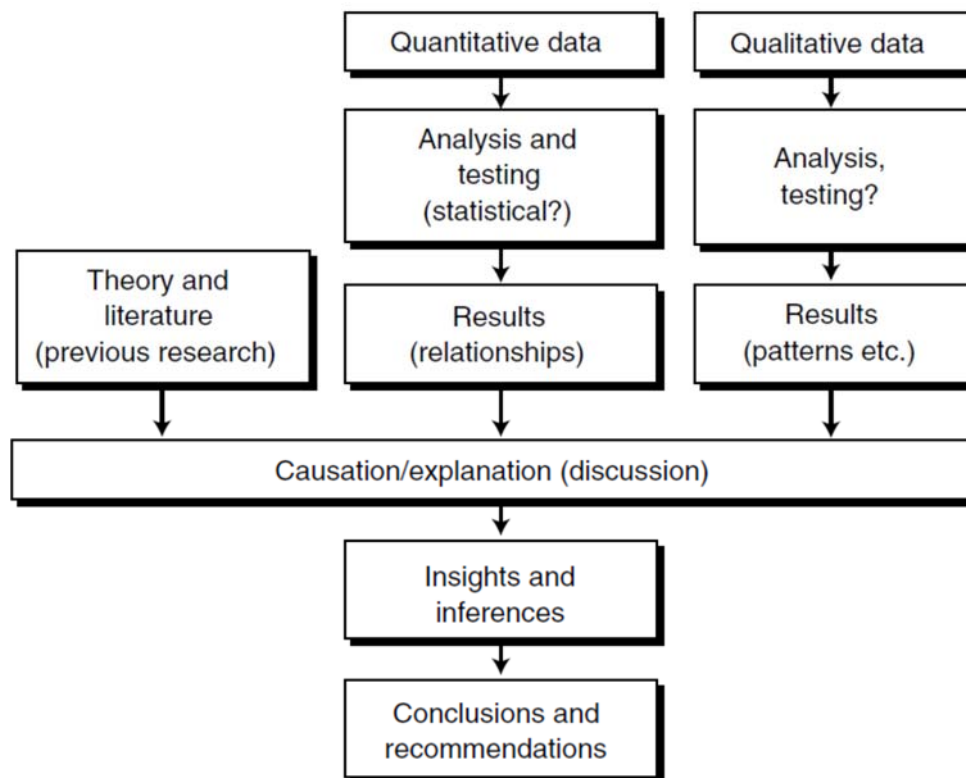


Figure 1 - Triangulation of quantitative and qualitative data

(Fellows & Liu,2008,P.10)

3.2.1.4 Selected Research Strategy and Justification

Selecting a suitable research method is very important to increase the strength, reliability, and validity of the research study. The decision on the research method depends on the purpose of the study and the available data required for the study.

For this research study, a quantitative research method was used. Given below are some of the reasons for selecting the quantitative research method over the qualitative research method.

- The quantitative method is more scientific than the qualitative method. In this method, a large no of data is analyzed scientifically.
- Less biased than the qualitative method
- This method is more structured than the qualitative method
- Data that is precise, reliable, and consistent, quantitative and numerical.
- Credibility is higher
- Data collection and data analysis is less time consuming than the qualitative method

3.2.2 Sample Selection

The researcher will not be able to collect data from the entire population due to the limitation of resources. Thus, it is required to select a sample to represent the population.

Sampling is a method that allows researchers to get information about the population without investigating each individual, based on the results of a subset of the population.

Reducing the number of people involved in a study will reduce costs and workload and make it easier to obtain high-quality information, but this should be balanced against a sufficient number of samples with sufficient power to identify a true association.

It is important to select a sample representing the entire population.

According to Saunders, Lewis, and Thornhill (2012), there are mainly two different sampling techniques are available to select a representative sample from the population. They are probability sampling and non-probability sampling. The below figure includes a summary of available sampling techniques.

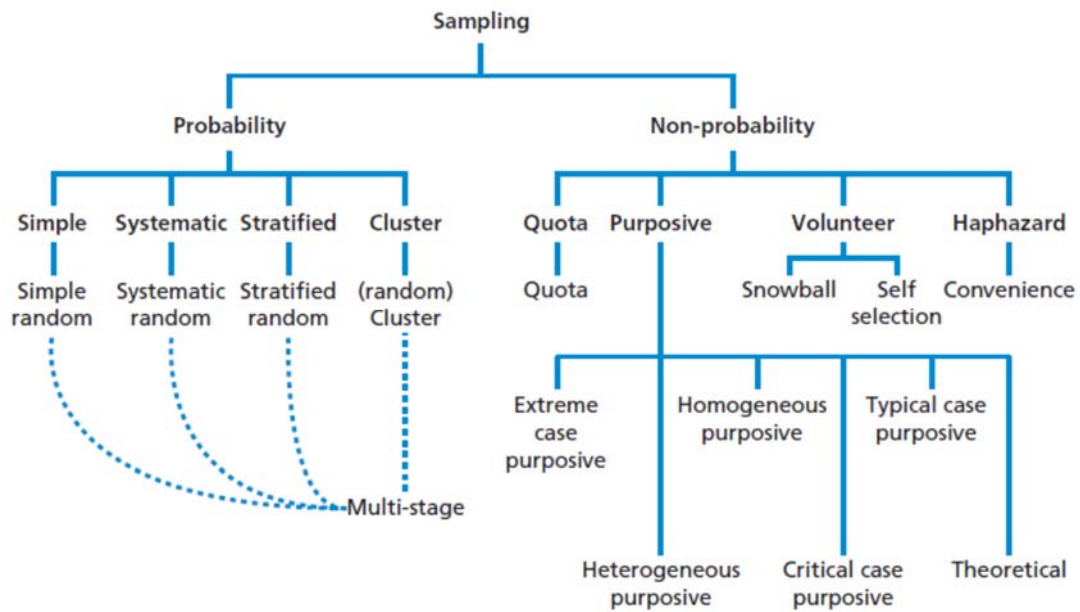


Figure 2 - Sampling Techniques

(Saunders, Lewis, and Thornhill, 2012, p.261)

Below mentioned sampling details were obtained from the same reference.

Each of these two techniques includes different types of techniques of sampling. Probability sampling includes simple random sampling, stratified random sampling, cluster sampling, systematic sampling, and multi-stage sampling.

Non-probability sampling includes quota sampling, snowball sampling, judgment sampling, and convenience sampling.

Simple random sampling is one of the sampling methods under probability sampling methods. In this method, each member of the population has an equal chance of being selected. This method will reduce biases of the result. But in this method, it is difficult to define a complete sampling frame and inconvenient to contact them.

One of the other types of sampling methods under probability sampling is the stratified sampling method. In this method, the population is subdivided into several groups while individuals with a common characteristic are grouped. This method is widely used when each subset has different properties but it is required to get a representative sample from the entire population. This method improves the accuracy and representativeness of results by reducing sampling bias. However, it requires knowledge of the appropriate characteristics of the sampling framework

Cluster sampling is also one of the sampling methods under probability sampling. In this method subgroups of the population are considered as sampling units. This method is known as cluster sampling because the population is divided into subgroups called clusters. In this method, if the selected cluster is not a representative one there may be a risk of bias.

Systematic sampling is the other type of sampling method under probability sampling. In the given method individuals from the population are selected at regular intervals. This method is more convenient than simple random sampling. But this also may lead to bias.

Multi-stage sampling is a development of cluster sampling. This is sometimes called multi-stage cluster sampling. This is normally used to overcome difficulties associated with a geographically dispersed population when face-to-face contact is required or when it is difficult to construct sampling for a large geographical area.

There are mainly four types of sampling methods under non-probability sampling.

Convenient sampling is one of them. This may be the most convenient method of sampling because; the selection is done based on the availability and the willingness to participate. There may be a risk of bias of the result because the sample may not be fully representative of the population.

Quota sampling is one of the sampling methods under non-probability sampling. This sampling method is widely used in market research. This method has the advantages of being relatively straightforward and potentially representative.

One of the other types of non-probability sampling is judgment sampling. This is also known as purposive sampling. In this technique, the researcher will decide on who participated in the survey among the population for the survey. The researcher may have to select a representative sample to match his requirement. This method is widely used by the media when reaching out to the public for opinion and in qualitative research. This research method is less time-consuming and cost-effective to perform research whilst resulting in a range of responses. But there is a risk of being not representative of the population due to the judgment of the researcher on the selection of sample.

Snowballing is the other type of non-probability sampling method. This falls under volunteer sampling methods. This method is widely used when investigating groups which are hard to reach. Snowballing method is effective when it is difficult to identify the sampling frame. This method also has the risk of being biased.

Many researchers used the random sampling method to get a representative sample while few researchers used snowball sampling. The snowball technique is used when there are difficulties to collect data through a sample that is selected randomly. (Praveen et al, 2010).

This study covers the building construction projects in Colombo which are conducted by the construction companies which hold CIDA grading CS2 in the building construction field. Participants in the survey were skilled laborers.

The non-probability sampling method was used in this study due to the low response rates in the studies in the Sri Lankan construction industry. Among the different techniques of non-probability sampling, the convenience sampling technique was used in this study.

According to the current situation, nine construction companies in Sri Lanka hold CIDA grading CS2 for the building construction field. In order to reduce the biases of the results samples were selected from four companies among the above-mentioned nine companies.

3.2.3 Data Collection Methods

Data collection is the method of collecting data from resources to find a suitable solution for the research question. The selection of the data collection method depends on several factors such as the nature of the study, type of data, and information that are required and which are available.

Data collection methods are mainly divided into two groups. They are the primary data collection method and secondary data collection method. The primary data collection method can be expressed as fieldwork and secondary data collection can be defined as desk study (Naoum, 2007).

According to Naoum (2007), there are three approaches for field work-study. Those are

- The survey approach
- The case study approach
- The problem-solving approach

3.2.3.1 The Survey Approach

A survey approach is used when it is required to gather data from a large number of respondents within a short period. There are mainly two types of surveys available and those are named descriptive survey and analytical survey.

The descriptive survey aims to answer the questions such as who? When? Where? How many? This approach mainly deals with counting responses of certain opinions regarding the specific object.

The aim of the analytical survey is to identify the relationship or connection between the objectives of the research.

3.2.3.2 The Case Study Approach

When the researcher needs to support his argument with the in-depth analysis of an organization, group of people, person, case study approach is used. Since this type of research focuses on one aspect of a problem, the conclusion that is developed may not be generalized. But it is related to one aspect of a problem.

There are mainly three types of case study designs available. Those are named as a descriptive case study, analytical case study, explanatory case study (Naoum, 2007).

3.2.3.3 Problem Solving Approach

In the both case study and survey approach, the researcher does not interfere with the previous research findings. In the problem-solving approach, the researcher can interfere with the findings of previous research studies, identify the problem, review the current situation, propose changes to the existing findings and evaluate the effects of the changes that they proposed. A problem-solving approach is common when researcher identifies the problem that is available with their work and willing to propose suitable measures to improve to the existing system.

Secondary data means the data that already published in journals, newspapers, books, online portals, etc. Data that are obtained from the sources mentioned above can be stored in statical format or descriptive format. There are some advantages of secondary data over primary data.

3.2.4 Primary Data Collection

Primary data collection is very important in order to propose a suitable solution for the research question. The decision on the data collection method can be made after finalizing the decision on the type of data to be collected and the research approach.

There are several methods available for primary data collection. Interviews, Postal questionnaires, observations, documents and records, focus groups, oral histories are some of the main methods.

According to literature, e-mail questionnaire surveys, postal questionnaire surveys, face-to-face interviews, field visits have been used for collecting data for construction-related studies.

3.2.4.1 Interviews

An interview is a conversation between two individuals for the purpose of collecting information for research. There are mainly three types of interviews. They are structured interviews, semi-structured interviews, and unstructured interviews.

Unstructured interviews mainly include open-ended questions. The direction of the interview depends on the responses of the interviewee. This is mainly used in qualitative research (Naoum, 2007).

Semi-structured interviews are more formal than unstructured interviews. This includes a combination of open and closed-ended questions but the questions are not scheduled in proper order.

According to Naoum (2007), some of the main characteristics of semi-structured interviews are as follows

- 1.0 Interviewees should have experience in the research subject area
- 2.0 Before starting the interview, proper analysis to be conducted

3.0 The interview is conducted on an interview guide related to hypotheses of the research

4.0 Interviewees experience regarding the research study to be focused

In semi-structured interviews, the interviewer has the flexibility to cover various areas and raise different questions during the interview.

In structured interviews, the same set of questions in the same order is asked from all interviewees. During the interview process, the interviewer has full control. Structured interviews mainly consist of closed-ended questions (Naoum, 2007).

According to Nachmias and Nachmias (1996) cited by Naoum (2007), there are three main assumptions of structured interviews. Those assumptions are given below.

1.0 Interviewees have sufficient vocabulary knowledge to understand the same meaning of the wordings of the interview

2.0 All the questions should be equally meaningful to each interviewee

3.0 The order of the questions must be unique and the meaning of each question is identical for each interviewee

Some of the main advantages of structured interviews are as follows

1.0 More accurate and reliable answers can be obtained

2.0 A high response rate can be expected

3.0 The responses can be explored by finding out 'Why' the particular answers are given.

Some of the disadvantages are high time consumption and difficulty to collect data.

3.2.4.2 Postal Questionnaire

A postal questionnaire is a common technique used for data collection for surveys. This method is to find out views, facts, and opinions of analytical and descriptive surveys. Questionnaire consist of closed-ended questions which require ranking or yes/no type of answers (Naoum, 2007).

Some advantages of the postal questionnaire are as follows:

- Data can be collected from large no samples cost-effectively
- Less time consuming
- Easy to analyze and visualize
- Questionnaire design can be used to cover all areas of research topics
- Respondents' identity is protected

There are some limitations of a postal questionnaire. Some of them are given below.

- A postal questionnaire needs to consist of simple and straightforward questions which can be easily understood by simple instructions. Wordings of the questionnaire should be clear in order to get the same meaning for all the respondents
- The flexibility of the technique is low. There is no opportunity for probing
- Respondents may provide general answers to questions. This may reduce the accuracy level of the answers
- A respondent may not be the competent person to fill the questionnaire. Hence there is no control over respondents
- Companies may receive a lot of questionnaires and due to workload they may not pay priority to complete questionnaires

According to Praveen et al (2010) questionnaire survey has been commonly used as a tool for data collection in studies in the construction industry. According to their study response rate of questionnaire surveys via email is less than that of face-to-face interviews. But in most of the studies related to the construction industry have used postal questionnaires for data collection.

Most of the other techniques are related to qualitative research methods.

There are several methods to analyze the data collected through questionnaire surveys. By adding numerical values to the data collection will reduce the time of data analysis. When designing the questionnaire special attention to be paid to plan the questionnaire well.

Questionnaire surveys are cost-effective and less time-consuming than interviews.

3.2.4.3 Selected Data Collection Method for the Study

A questionnaire survey is the main data collection method used for this study. Instead of postal questionnaires, printed questionnaires were distributed among the selected construction sites.

Two Questionnaire surveys were conducted to collect data for the research:

- 1) The first questionnaire survey was a pilot survey. The purpose of this survey was to identify the issues with the prepared questionnaire survey and to fine-tune the questionnaire based on the issues identified from the previous literature survey.
- 2) The second Questionnaire Survey was conducted among skilled laborers in the field of construction industry representing the above sites.

3.2.5 Questionnaire Design

Questionnaire preparation should be done carefully in order to address the objectives of the research.

According to Naoum (2007), three basic stages need to consider during questionnaire preparation.

1. Identification of first thought questions
2. Construction of the final questionnaire
3. Checking the wordings of questions

Initial preparation of questionnaire can be done by referring literature review and as well as objectives of the research. All possible questions need to be considered in this stage. Order of the questions and proper wordings of them can be considered in later stages.

In the second stage, sectioning of the questionnaire can be done. Identified questions in the previous stage can be distributed to sections during this stage.

In the final stage of questionnaire preparation, the wordings of the questionnaire should check properly. Questions should be short as possible but comprehensive to get a clear idea about the question. Order of the questions to be corrected.

Factual questions and opinion-type questions can be included in the questionnaire. The suitable type of questions to be selected is based on the research requirement.

Opinion type questions can be asked in several formats

- Checklist
- Grid
- Rating scale
- Likert scale
- Numerical rating scale
- Ranking
- Semantic differential scale

Checklist-type questions consist of a list of items where respondents are given the opportunity to tick or mark. This type of question is easy to collect data and analyze. Checklist-type questions there is no opportunity to provide a degree of intensity.

Grid-type questions can be expressed as a detailed version of the checklist format.

Rating scale questions can be used to express the opinion or view of the respondent of an event or object. This is also a detailed version of the checklist format. Respondents are allowed to express the degree of agreement/disagreement.

Likert scale questions are similar to rating scale questions except the questions consist of an attitudinal statement.

Numerical rating scale questions are also one of the common formats for data collection. Respondents are allowed to score for the questions.

In ranking-type questions, respondents are allowed to rank based on priority, preference, or importance (Naoum, 2007).

In this research questionnaire preparation, Likert scale types of questions were included. Respondents are allowed to mark on a Likert scale 1 to 5 based on the importance of the factor.

The selected Likert scale is as follows

1 - Very low important

2 - Low important

3 - Medium important

4 - High important

5 - Very high important

3.2.5.1 Techniques for Enhancing Response Rates

Several techniques which were found during the literature survey were adapted during the questionnaire design to enhance the response rate.

Some of the techniques adopted were, removing questions which are related to sensitive information about the person who is responding to the questionnaire as well as their company, Simple questioned placing at the beginning of the questionnaire, providing letter along with the questionnaire survey assuring the confidentiality of the information provided by the respondent (Praveen et al, 2010).

Some of the techniques used are given below:

- Preparation of questionnaire in the Sinhala language that is understood by the layperson because most of the target population is not fully educated
- Avoid questions that involve sensitive information about the person who is responding to the questionnaire as well as their company
- Explain to the respondent the purpose of the study and how their feedback will be used.
- Simple questioned placing at the beginning of the questionnaire
- Providing a statement along with the questionnaire survey assuring that the data which are collected will be used only for the academic purpose and information and identity of the respondents will not be disclosed.
- Shorten the questionnaire survey as much as possible

Initial Questionnaire was prepared with the aid of facts obtained by a literature survey. The pilot survey was conducted using an initial questionnaire among eight skilled laborers in the construction industry representing the target population.

During the pilot survey, the following factors were considered

- Time is taken to complete the questionnaire
- Whether the given instructions are clear?
- Whether the wordings of the questions are clear and provides the correct meaning?
- Is there any difficulty to answer questions?
- Any other comments

The questionnaire was fine-tuned based on the feedbacks of the pilot survey.

The fine-tuned questionnaire was sent to the target group along with the statement providing the purpose of the study, how their feedback will be used, and assurance of the confidentiality of the information.

The questionnaire was sent to managerial staff of the selected sites of the above companies to get the questionnaire filled by the skilled laborers. It was targeted to get sixty responses. Several follow-up calls were made and thirty-one responses were obtained.

The questionnaire mainly consisted of three sections,

Section 01 – Background Information of the respondent

Section 02- Reasons for dissatisfaction/ reduction of satisfaction

Section 03- Expected changes in the construction industry by skilled laborers

3.2.6 Data Analysis Method

During the data collection process, a lot of information is gathered and it is difficult to present every information of it. In order to highlight the most important findings of the research, it is required to follow a proper data analysis method.

There are mainly three methods for analyzing and summarizing data effectively and efficiently.

1. Exploratory data analysis is mainly used for analyzing open-ended questions
2. Descriptive method of analysis includes frequency distribution, normal curves, tendency analysis
3. The statistical analysis includes several methods such as “chi-square test”, “t-test” and Spearman ‘rho’ ranking correlation

Based on the literature there are several types of statistical data analysis methods used for this type of research. Some of them are given below.

Praveen et al (2010) have used the concept called “Significance Index (SI) “and “Importance Index (II)” for analyzing the data collected from the studies. SI is used for ranking causal factors and their effects. At the same time, II is used for ranking mitigation measures.

$$SI = \sum a \left(\frac{n}{N}\right)\left(\frac{100}{2}\right)$$

Where

a = Weight depending on the degree of significance

n = Number of occurrence of response

N = Number of total responses

$$SI = \sum a \left(\frac{n}{N}\right)\left(\frac{100}{2}\right)$$

Where

a = Weight for the degree of Importance

n = Number of occurrence of response

N = Number of total responses

Praveen et al (2010) have prepared a questionnaire survey to get the opinion from different parties such as contractors, consultants, clients. Spearman's correlation coefficient method was used to compare the agreement between different parties.

During the data analysis of the study, they have shown the participation percentage from several types such as participation by employment, participation by involvement type, participated contractors from their ICTAD grading, the respondent by district, participants year of experience, etc. (Praveen et al, 2010).

Fernando, Fernando, and Gunarathna (2016) have used the Relative Importance Index (RII) and Binomial tests to analyze data.

$$RII = \frac{\sum(V_i \times F_i) \times 100}{W \times n}$$

Where

V_i = Rating of each Factor

F_i = Frequency of response

W = Highest Weighting

n = Total Number of responses

In this research, data collected through the questionnaire survey were used to analyze in order to achieve the main objectives of the study.

Relative Importance Index (RII) was used to analyze data.

As mentioned earlier, the questionnaire mainly consisted of three sections,

Section 01 – Background Information of the respondent

Section 02- Reasons for dissatisfaction/ reduction of satisfaction

Section 03- Expected changes in the construction industry by skilled laborers

From the background information of the questionnaire following information of the respondents was collected.

- Educational background
- Whether formal training has received or not
- Current Salary
- No of years of experience in the field
- Age
- Social status
- Whether he is a full-time occupant or not

Under section 02 of the questionnaire, reasons for dissatisfaction or reasons of reduction of satisfactory levels at workplaces were identified.

There were mainly nineteen (19) reasons which were identified through a literature survey.

Those reasons were ranked according to the relative importance index (RII) based on the thirty-one responses (31) received from the questionnaire survey.

Reasons which have RII value above the average value were considered as very important factors which need to be addressed immediately to improve the satisfactory level of the skilled laborers.

According to the above analyze nine (09) factors were identified as very important factors among nineteen (19) factors. The ranking of those factors is included under chapter 04 of this report.

Under section 03 of the questionnaire, expected changes in the construction industry by skilled laborers to improve the satisfactory level of work were identified.

There were mainly thirteen (13) factors identified from the literature survey.

Those factors were ranked according to the relative importance index (RII) based on the thirty-one (31) responses received from the questionnaire survey.

Factors that have RII value above the average value were considered as very important factors which need to address immediately to improve the satisfactory level of the skilled laborers.

According to the above analysis seven (07) factors were identified as very important factors among thirteen (13) factors. The ranking of those factors is included in chapter 04 of this report.

3.3 Assumptions and Limitations of the Research

Data collection for the research was done from the building construction sites in Colombo which are conducted by construction companies which are holding the highest CIDA accreditation (CS2) for building construction.

During the data analysis, it was observed that most of the skilled laborers on sites are not working under the main contractor. Hence, results observed during the research may not fully represent the above companies. Since most of the sub-contractors are working under several main contractors this result may be applied to them as well.

The study was done with the participation of Sri Lankan skilled laborers only. Issues available with the foreign skilled laborers who are working in the Sri Lankan construction industry may differ from the results of this study.

Chapter 04

4 Results and Discussion

4.1 Introduction

This chapter includes the analysis of data gathered in the questionnaire. Further, this includes a detailed discussion of the results obtained from the data analysis.

4.2 Background Information of the Respondent

The figure below provides the age range of participants of the study.

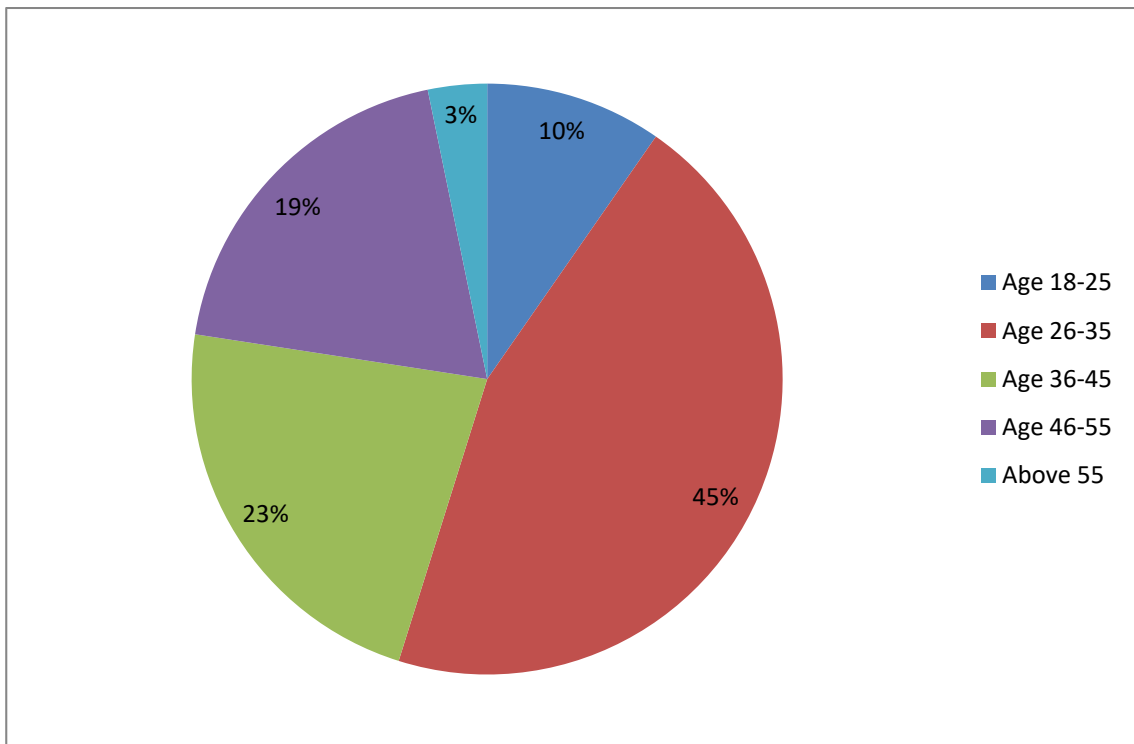


Figure 3 - Age Distribution of Respondents

As explained in the previous chapters 31 responses were received for the questionnaire conducted among skilled laborers. The age distribution of the respondents is shown above. Most of the respondents are in the age group of 26 – 35. This implies that more than 50% of respondents are younger.

Some of the facts observed during the questionnaire analysis may be related to the age group of respondents. For example one of the main change that they expect at the site was to introduce new technological devices to the site. That may be because most of the

younger generation are willing to implement new technology into their daily lifestyle. By introducing new technological devices to sites, the bitter nature of the construction sites can be reduced.

They have highlighted that lower recognition for their carrier is also one of the main difficulties that they face. The majority of the younger generation are more concerned about social status.

The figure below demonstrates the percentage of relationship status; married and unmarried of the respondents.

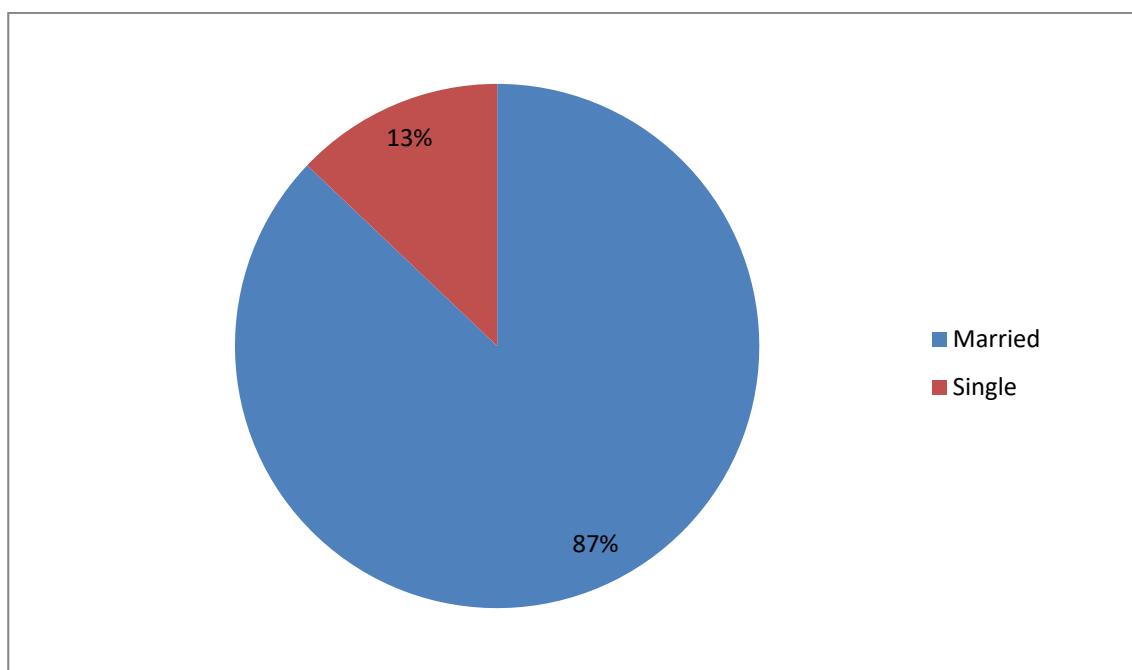


Figure 4 – Relationship Status of Respondents

According to the above graph, 87% of the respondents are married. Most of the issues that they highlighted during the questionnaire survey may be due to this fact. For example lower recognition by society and having less freedom than other industries are some of the main issues that they have highlighted.

Since most of them are married they may have above issues than an unmarried laborer. A detailed discussion of the issues is included in the following sections of this chapter.

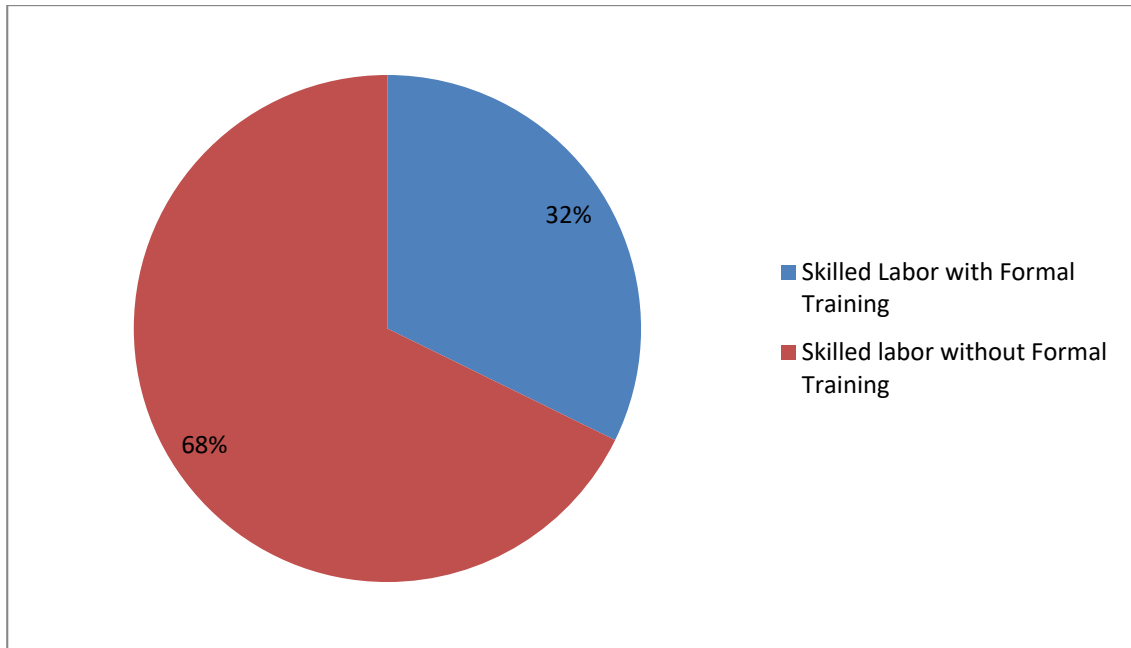


Figure 5 - Training Status of Participants

The figure above depicts if the selected labor force consists of individuals that have experienced systematical training or without systematical training. Most of the respondents did not have formal training. They have become skilled laborers by their experience.

Previous literature also supports the above fact. Silva et al (2005) have revealed that most of the skilled laborers in the Sri Lankan construction industry are not systematically trained.

Since they don't have formal training they may not be fully aware of new technology. They may have increased their skills through practice. But the productivity of the skilled labor force may be increased by providing systematic training for them.

This is a serious issue in the Sri Lankan construction industry. Although there are several training programs conducted by government as well as private companies, there is no sufficient number of candidates for the same.

Detailed discussion regarding training is included in the next sections of this chapter.

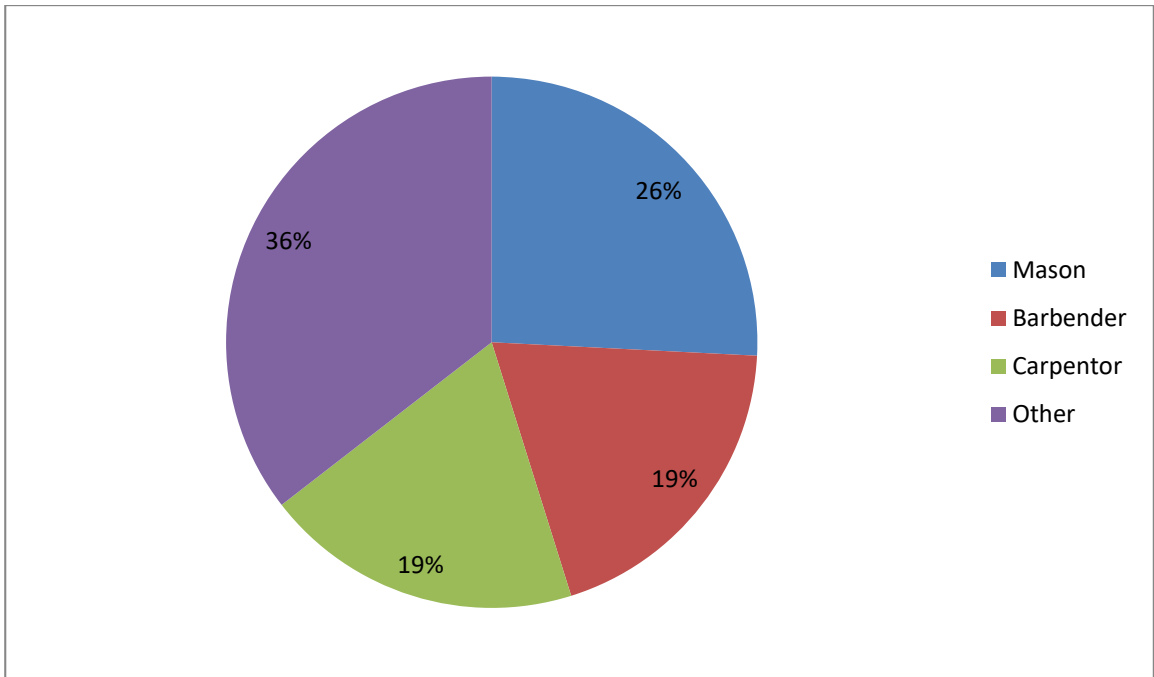


Figure 6 - Participants Labor Categories

The figure above shows the details of the category of the participants for the questionnaire survey. The questionnaire survey was conducted among building construction projects in Colombo. In the above figure, another category represents tillers, painters, plumbers, and painters.

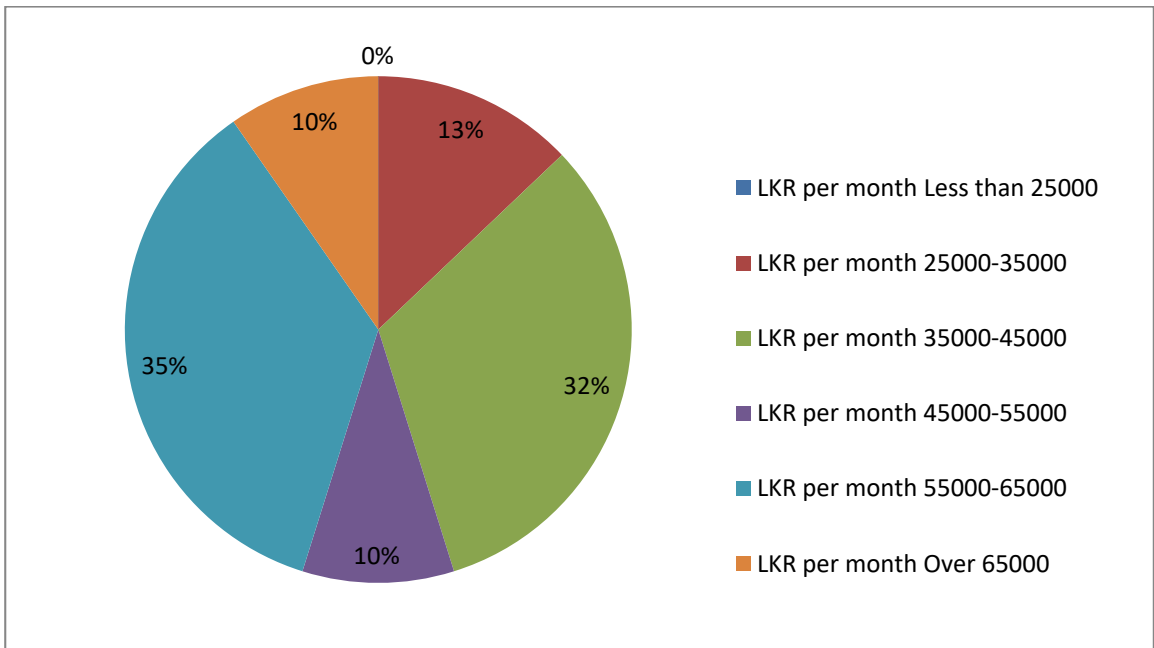


Figure 7 - Salary Details of Respondents

The figure above demonstrates the categorization of respondents based on their salary. According to the responses, there is no anyone whose salary is less than LKR 25,000.00 per month. More than 50% of the respondents are earning more than LKR 45,000.00 per month.

The mean value of the monthly wages of the selected group is LKR 51,790.00

The below table includes the comparison of the above finding with the monthly mean gross salary of other sectors of the Sri Lankan workforce.

Table 2 - Comparison of Mean value of Monthly Gross Salaries

	Agricultural sector Workers	Industrial Sector Workers	Service Sector Workers	Construction Skilled Laborers
Mean Monthly Salary (Rs)	21,852.00	35,672.00	43,378.00	51,790.00

The mean monthly salary of the agricultural, industrial, and service sector workers are obtained from Statistics (2019).

According to the analysis of Statistics (2019), the construction industry is categorized under the “industrial” sector. It is clear that the average monthly wages of the skilled laborers of the construction industry are above most of the other sectors.

When analyzing responses to the questionnaire, it was observed that one of the main issues that they highlighted was their earning are lower compared to the bitterness of the job. The bitterness of the carrier of skilled labor is indeed higher than most of the other carriers.

The figure above demonstrates the distribution of types of employment of the respondents.

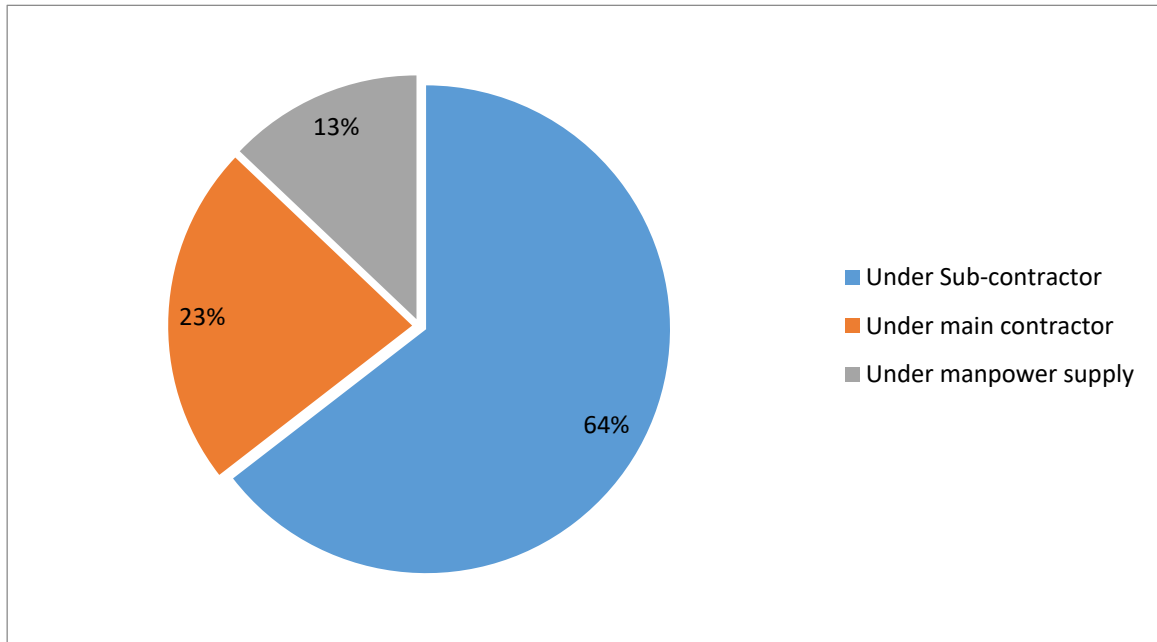


Figure 8 - Type of Employment of Respondents

Data collection for the questionnaire was done from the construction building sites in Colombo which are carried out by CS2 building contractors in Sri Lanka. From the above figure, it is clear that most of the skilled laborers are not directly employed under main contractors. Most of them are employed under subcontractors or manpower suppliers.

The actual percentage of sub-contractor and manpower suppliers may be higher than the above percentages. Because the questionnaire distribution was done among the selected skilled laborers of the above sites.

Construction companies are not maintaining a permanent labor force with them because it increases their cost during idling periods. Most of the time construction works are carried out by small-scale sub-contractors. Most of the small-scale sub-contractors are not financially stable to maintain a permanent labor team with them and provide facilities to them.

This is one of the main issues in the Sri Lankan construction industry. Since most of the laborers are not directly under the employment of main contractors they may not

receive required facilities such as sufficient accommodation facilities, health insurance facilities, sanitary facilities, etc.

If main construction firms in Sri Lanka can maintain a permanent labor force with them that would create a better environment for skilled laborers. There may be practical difficulties of doing the same and detailed discussion about the same is included in the next sections of this chapter.

4.3 Causal Factors for Dissatisfaction/Reduction of Satisfaction

4.3.1 Ranking of Causal Factors

Causal factors which were identified from previous literature were ranked using Relative Importance Index (RII) calculations.

Table 3- Causal Factors for dissatisfaction/Reduction of Satisfaction

Item No	Causal Factor	RII	Rank
1	Failure to receive appreciation for the work by Supervisor or senior staff	0.56	9
2	Verbal harassment at workplaces by Supervisor or senior staff	0.53	11
3	Having to work long Hours	0.57	5
4	Need for traveling from location to location due to Worksite location changes within a short period	0.45	19
5	Nonavailability of proper site accommodation	0.47	17
6	Nonavailability of transportation facilities between site and accommodation	0.50	13
7	Poor environmental conditions at Workplaces (Ex: No sanitary facilities, no proper location for meal arrangement, etc.)	0.50	14
8	Higher bitterness of the job compared to other available career opportunities	0.57	6
9	Low pay compared to the bitterness of the job	0.65	2
10	Lower recognition by the society for the career	0.57	6
11	The high degree of life risk due to safety issues at the site	0.52	12
12	Having less freedom than other industries (Lack of holidays/lack of freedom to spend time with families)	0.56	8
13	Uncertainty in employment	0.65	1
14	No clear career path and career development	0.64	3
15	Not having adequate work experience and sufficient training has not been provided by companies	0.54	10
16	Although new technological equipment available at the site there is no proper training for the same	0.49	16
17	Lack of health insurance provided by the company	0.60	4
18	Working in the construction industry as a part-time worker	0.49	15
19	Family members do not like this career	0.45	18

Causal factors which have an RII value above the average were considered as very important factors.

Base on the above method, 9 factors that were identified as most important Causal Factors for dissatisfaction/Reduction of Satisfaction of Skilled Laborers at the site are as follows:

Table 4 -Most Important Causal Factors

Causal Factor	Ranking
Uncertainty in employment	1
Low pay compared to the bitterness of the job	2
No clear career path and career development	3
Lack of health insurance provided by the company	4
Having to work long hours	5
Higher bitterness of the job compared to other available career opportunities	6
Lower recognition by the society for the career	7
Having less freedom than other industries (Lack of holidays/lack of freedom to spend time with families)	8
Failure to receive appreciation for the work by Supervisor or senior staff	9

4.3.2 Discussion on Important Causal Factors

Factors which were identified as most important factors were discussed with some of the industry experts such as senior project manager, Industry expert consultants, and senior quantity surveys. According to their view above factors are very important factors. If the above causes for dissatisfaction can be reduced, skilled laborers could be attracted and retained in construction sites.

Some of the important factors which were highlighted by the industry experts regarding the above factors are given below.

4.3.2.1 Uncertainty in Employment

The feeling of uncertainty of the employment causes the dissatisfaction feeling of the employee. This problem applies not only to the skilled laborers in the construction industry but also to almost all the carriers.

Most of the construction companies do not maintain a permanent skilled labor force due to various reasons such as high fluctuation of labor demand due to rapid changes of the industry. Hence construction companies tend to follow sub-contracting models as well as recruit laborers through manpower suppliers.

Most of the skilled laborers working under small-scale sub-contractors are working in temporary nature. Sub-contractor skilled labor requirement fluctuates with the workload of the sub-contractor. Most of the time skilled laborers are not in long-term employment with sub-contractors.

This has increased the non-permanent status of the employment of skilled laborers in the construction industry.

There are current situation evidences with COVID 19 regarding the uncertainty of employment. Almost all the industries in Sri Lanka including the construction industry temporary have been closed approximately for two months period. During that period salary cut downs were there for most of the employees in the country. Skilled laborers who worked as day pay laborers will get nothing for the same period.

As explained above, most of the skilled laborers are working under subcontractors under a temporary nature. Since most of the construction sites were closed due to COVID 19 situation, subcontractors were not paid. Most of the small-scale subcontractors are not financially stable to withstand idling periods while paying salaries for their employees. Due to this matter, skilled laborers may not receive sufficient payment during the above period.

Skilled laborers who were permanently employed under large-scale main contractors may receive at least the basic salary. Although skilled laborers earn comparatively higher than other carriers, a higher portion of their salary consists of overtime payments and target payments. During the idling period, they will receive a comparatively low amount.

If main contractors in the country can deploy and maintain a permanent skilled labor force with them, this will be beneficial to improve the permanent status of the employment of skilled laborers.

Once the permanent status of employment is improved, skilled laborers will be able to work at a more satisfactory level. At the same time, more employees will be attracted to the skilled labor field.

4.3.2.2 Low Pay Compared to the Bitterness of the Job

The work bitterness of skilled laborers in the construction industry is comparatively higher than the other available opportunities such as security officers, three-wheel drivers, etc. Their work bitterness has increased due to long working hours, working under extreme weather conditions, etc.

The wages of skilled laborers in the construction industry are comparatively higher than other available career opportunities.

But according to the opinion of the skilled laborers, wages are comparatively lesser considering the work bitterness. Most of the younger generations expect a higher income without much work bitterness.

This has led to dissatisfaction with skilled laborers.

In order to sort out this matter, wages of skilled laborers have to increase or more technology to be introduced to sites to make construction work easier.

Increasing wages without improving productivity will have adverse effects on the construction industry. If productivity can be improved, wages can be increased without adverse impacts. For example, foreign workers such as Chinese workers in construction are paid much higher than Sri Lankan skilled laborers. But their productivity is also comparatively higher than Sri Lankan laborers.

Most of the Sri Lankan skilled laborers are capable of improving productivity when they are paid well. For example, when skilled laborers are allowed to work on a target overtime system, they increase their productivity much higher.

Hence it is a requirement to make arrangements to improve the wages based on the performance of the skilled laborers. Then skilled laborers will work more efficient manner and they will be able to earn more. It will help to improve the satisfaction of the skilled laborers.

4.3.2.3 No Clear Career Path and Career Development

The career of skilled laborers in the construction industry has not systematically developed in Sri Lanka. There isn't a proper career development path.

The only career development path for laborers in the construction industry is to become skilled laborers after acquiring experience from unskilled labor. Due to this reason skilled laborers have to work many years without further career developments or promotions.

This has created an adverse impact on the satisfaction of the skilled laborers.

Due to not having better career development paths, skilled laborers have to work hard in the retirement age also.

When looking at the needs and expectations of the younger generation, they expect a better career development path.

In the construction industry also there is a possibility of creating a better career development path with a better promotion system after doing performance appraisals.

Career ladders of laborers will be unskilled laborers, skilled laborers, Forman, supervisor, technical officer, etc.

If a proper career development path can be arranged in the construction industry, school children can be educated regarding the possible opportunities in the construction industry. That will be beneficial to attract more to the construction industry as well as to improve the satisfactory level of the existing skilled laborers.

4.3.2.4 Lack of Health Insurance Provided by Company

Most of the construction laborers do not have a proper health insurance scheme. The main reason for the same is the temporary nature of the employment and most of the skilled laborers are working under sub-contractors.

Due to not having proper health insurance facilities, they may face a lot of difficulties when they encounter accidents. Most of the time, they temporarily lose their income due to accidents.

Skilled laborers in the construction industry are prone to accidents due to the risk nature of the job.

This is one of the reasons for the dissatisfaction of the skilled laborers in the construction industry.

Most of the time large construction firms use sub-contractors for most of their work. Due to the temporary nature of the industry sub-contractors are working under several large construction companies from time to time. At the same time, skilled laborers are working under several construction companies from time to time.

Although skilled laborers are full-time available with the construction industry their employment with one Construction Company is temporary. Hence, it is difficult to provide health insurance from one company.

In order to solve the problem, there are some suggestions proposed in the literature.

(Kim and Philips, 2010) have done investigations to check the impact of health insurance on the retention of the worker in the construction industry. During their study they discuss two concepts; Job lock and Industry lock. Industry lock means the retaining at the construction industry. Job lock means the retaining at the same construction company.

They discuss two types of health insurance; Portable and Non-portable health insurance. Portable health insurance provides facilities to change their employer without losing the insurance coverage.

The same concept can be implemented in Sri Lanka as well. Involvement of government and regulatory bodies of the construction industry will be required to take the necessary actions to implement this

This will help to provide better health insurance facilities to the skilled laborers in the construction industry and it will help to improve the satisfactory level of the skilled laborers.

4.3.2.5 Having to Work Long Hours

Construction workers have to work long working hours according to the nature of the industry. Most of the construction sites work beyond normal working hours. In most sites, it is mandatory to work for extended hours.

Although they are paid for the extended hours, it may be difficult for them to work extended working hours every day. They may not have the freedom to fulfill the requirements of their personal life.

Some of the sites operate on a 24-hour basis on multiple shifts. In such situations, laborers have to work night shifts as well

Regular long hard-working hours, as well as regular night working hours, may adversely affect the health also.

Further, long working hours will reduce the efficiency level of the skilled laborers as well.

If it is possible to change long working hours to flexible working hours, it may increase the satisfactory level of the skilled laborers. Strategy to be followed to introduce flexible working hours without affecting the progress of the sites.

If this can be implemented, skilled laborers will have sufficient time to spend to fulfill responsibilities to their families.

4.3.2.6 Higher Bitterness of the Job Compared to other Available Career Opportunities

The work bitterness of skilled laborers in the construction industry is comparatively higher than the other available opportunities such as security officers, three-wheel drivers, etc. Their work bitterness has increased due to long working hours, working under extreme weather conditions, etc.

This has led to dissatisfaction with skilled laborers.

Most of the younger generations are expecting jobs with less work bitterness as well as with higher freedom. That's why a considerable amount of school leavers are joining the labor market as three-wheel drivers.

Site work bitterness can be decreased by introducing more technology to construction sites. Once more technology is introduced to sites; the younger generation will be attracted to sites. Because younger generation prefers to work with new technologies.

4.3.2.7 Lower Recognition by Society for the Career

Skilled laborers in the construction industry have very low recognition from society due to various reasons.

Although earning capacity of skilled laborers in the construction industry is higher than the other available career opportunities such as security officers, etc., recognition for the career is very low compared to other careers.

Non-permanent nature of the employment, non-availability of health insurance facilities, less freedom, non-availability of proper uniform, verbal harassment, non-availability of career development path, etc., maybe some of the reasons for low recognition from society.

Lower recognition for the career may create a lot of social issues for skilled laborers.

This has led to dissatisfaction with skilled laborers.

In order to solve the problem, it is required to systematically improve the career of skilled laborers of the construction industry.

Some of the changes that can be proposed to improve recognition of the career are, increase training facilities to improve the number of systematically trained skilled laborers in the industry, media campaigns regarding the available opportunities of the construction industry, introducing proper uniforms, etc.

4.3.2.8 Having Less Freedom than other Industries (Lack of Holidays/Lack of Freedom to Spend Time with Families)

Skilled laborers in the construction industry have less freedom than some of the other career opportunities.

Most of the construction sites work beyond normal working hours. In most sites, it is mandatory to work extended hours for skilled laborers.

Some of the sites operate on a 24-hour basis on multiple shifts. In such situations laborers has to work night shifts also.

Due to this matter, skilled laborers have very little freedom. They haven't sufficient time to fulfill the requirement of their personal matters. Most of the time they are unable to get leaves as per their wish. Once they ask for leaves they have to undergo verbal harassment of their superiors.

Due to this, they will not be able to fulfill their social responsibilities especially to their families and to their loved ones.

Hence, they may have social issues and it has led to dissatisfaction regarding their career.

If it is possible to make better leave arrangements etc., for skilled laborers, it will automatically improve the freedom of them and it will help to improve the satisfaction of the skilled laborers.

This will help to attract and retain more skilled laborers in the construction industry.

4.3.2.9 Failure to Receive Appreciation for the Work by Supervisor or Senior Staff

Anyone likes to get recognition or appreciation for the work that they are doing. Most of the time skilled laborers in the construction industry are not receiving any appreciation for their job from their supervisory level or higher level staff at the site.

Instead of that, they have to face verbal harassment from their superior staff.

This will create dissatisfaction with their career.

If it is possible to provide an appreciation for the work that they are doing and about their skill, they may try to their job in a better way.

This will help increase the satisfactory level of the skilled laborers in terms of their job.

4.4 Expected Changes for Improving Satisfactory Levels of Skilled Laborers

4.4.1 Ranking of Expected Changes

Possible changes that are expected by skilled laborers are ranked using relative importance index (RII) calculations.

Table 5 – Expected Changes for Improving the Satisfactory Levels

Item No	Changes Expected by Skilled Laborers	RII	Rank
1	Allow working more overtime hours	0.98	2
2	Increase day salary and overtime rate	0.98	1
3	Allow working multiple shifts	0.71	13
4	Allow working as target overtime schedules	0.86	10
5	Assess skills properly and increase salary accordingly	0.90	8
6	Improve environmental conditions at Workplaces (Ex: sanitary facilities, the proper location for meal arrangement, etc.)	0.86	12
7	Make better employment under the main contractor rather than under sub-contractor or manpower supplier	0.88	9
8	Provide training opportunities and provide sufficient salary during training	0.94	6
9	Provide promotions with the work experience (Ex: Provide designations such as Forman, a technical officer with the work experience)	0.86	11
10	Provide a service letter at the end of employment and make it a beneficial document for next employment	0.92	7
11	Introduce new technological equipment for site works and provide training for the same	0.97	3
12	Provide better health insurance facilities by the company	0.95	5
13	Introduce new safety devices to sites and provide training for the same	0.95	4

Factors that have an RII value above the average were considered as very important factors. Base on the above method, 7 factors were identified as the most important changes. Those are given below:

Table 6 - Most Important Changes for Improving the Satisfactory Levels

Changes Expected by Skilled Laborers	Rank
Increase day salary and overtime rate	1
Allow working more overtime hours	2
Introduce new technological equipment for site works and provide training for the same	3
Introduce new safety devices to sites and provide training for the same	4
Provide better health insurance facilities	5
Provide training opportunities and provide sufficient salary during training	6
Provide a service letter at the end of employment and make it a beneficial document for next employment	7

4.4.2 Discussion on Most Important Expected Changes

Factors which were identified as most important changes were discussed with some of the industry experts such as senior project manager, Industry expert consultants, and senior quantity surveys. According to their view above changes are very important to attract and retain skilled laborers in the construction industry.

Some of the important factors which were highlighted by the industry experts regarding the above factors are given below.

4.4.2.1 Increase Day Salary and Overtime Rate

Skilled laborers in the construction industry are expecting higher salaries than the present salary.

According to their view, they will be more satisfied if they get paid higher than the present. That is human nature and almost all the employees are expecting higher salaries.

If the laborers of the construction industry are skilled and efficient they can earn a comparatively higher salary than other available career opportunities.

Increasing wages without improving productivity will make adverse effects on the construction industry. If productivity can be improved, wages can be increased without adverse impacts. For example, foreign workers such as Chinese workers in construction are paid much higher than Sri Lankan skilled laborers. But their productivity is also comparatively higher than Sri Lankan laborers.

Most of the Sri Lankan skilled laborers are capable of improving productivity when they are paid well. For example, when skilled laborers are allowed to work on a target overtime system, they increase their productivity much higher.

This factor is discussed in the previous section of this chapter as well.

4.4.2.2 Allow to Work More Overtime Hours

Skilled laborers of the construction industry are expecting more overtime hours to work. The main purpose behind this is also to earn more.

Expecting to work overtime hours has become a practice of skilled laborers. Most of them are working inefficiently during normal working hours in order to work more during overtime hours.

This situation can be identified when analyzing the efficiency difference when they are allowed to work on the target overtime system and when they are not allowed to work on the target overtime system.

When skilled laborers are allowed to work on a target overtime basis they work in a very efficient manner.

Hence, although allowing working more on an overtime basis will increase the satisfaction of skilled laborers, which is needed to do carefully without making adverse impacts to project cost.

Better supervision and performance monitoring system should be implemented to get the job done by skilled laborers properly.

4.4.2.3 Introduce New Technological Equipment for Site Works and Provide Training for the Same

Introducing new technological equipment to sites to make the work easier is one of the requests of skilled laborers to increase their satisfaction. Especially younger generations are willing to work with new technology.

Introducing new technology will reduce the work bitterness and same time it will increase the efficiency.

There are various types of new machines available to make work easier and efficient. Although it requires initial capital to introduce new machines to sites, it will make long-term benefits in terms of cost when considering the reduction of labor cost due to efficiency increase.

Introducing new machines will not be beneficial if proper training is not provided. Hence, providing new machines and provides training for the same will be beneficial.

It will help to improve the satisfaction of the skilled labor force.

4.4.2.4 Introduce New Safety Devises to Sites and Provide Training for the Same

Introducing new safety devices and provides proper training regarding those is also one of the requests of skilled laborers to improve their satisfaction regarding their careers.

Skilled laborers in the construction industry are prone to accidents due to the risk nature of the job.

Due to the non-availability of proper personal protective equipment (PPE), the impact of the accident may increase. Some of the accidents may end up with death or permanent disabilities.

Accidents make an adverse impact not only on the skilled laborers but also it will adversely impact the company image, site progress, project cost, etc.

Most of the skilled laborers don't have proper health insurance facilities and they have to face a lot of difficulties when they meet with accidents.

If proper PPE's and training for PPE are provided to laborers, that will be beneficial to improve the safety at sites.

Improving site safety will improve not only the satisfaction of skilled laborers but also grant many advantages to sites as well.

4.4.2.5 Provide Better Health Insurance Facilities

As discussed in the previous chapter construction industry mostly consist of laborers who do not have proper health insurance facilities due to various reasons.

Due to the nature of the construction sites, there is a high risk of accident occurrence. Since most of the skilled laborers don't have proper health insurance facilities they may have to face a lot of difficulties when they met with accidents.

If proper health insurance facilities are provided, they will be able to get rid of most of the difficulties such as loss of income, etc., when they are met with an accident.

There are some practical difficulties available when providing health insurance for skilled laborers due to various reasons.

Those reasons and possible solutions were discussed in previous sections of this chapter.

However, if proper health insurance facilities can be provided to skilled laborers, they will be more satisfied.

4.4.2.6 Provide Training Opportunities and Provide Sufficient Salary during Training

Providing proper training opportunities and provide sufficient salary during the training period is one of the requests of skilled laborers to improve their satisfaction.

During the analysis of the responses to the questionnaire survey, it was identified that most of the skilled laborers are not systematically trained.

There may be various reasons for that. Non-availability of sufficient training facilities, loss of income during the training period maybe some of the reasons.

If a sufficient training salary is not provided during the training period, providing training facilities will not be sufficient. Most of the time, laborers in the construction industry depend on day-to-day income. If they have to lose their income during the training period, they will not be attracted to training.

Providing part-time training facilities will be a suitable solution in order to attract and retain laborers to training courses. In this method, laborers can get the training while receiving a monthly salary.

Some of the leading construction companies in Sri Lanka have started vocational training programs collaborated with the Department of technical education and training to produce skilled laborers. The training program consisted of six weeks of institutional training (IT) & six weeks of Onsite training (OJT). The institutional training conducted in Technical Colleges and Onsite training was provided at the company in an ongoing construction project site.

Required materials, overalls, and training allowance were provided to the trainees free of charge. Relevant assessments & evaluations were carried out during and after IT & OJT.

Many challenges were faced during the program. One of the main challenges was the lesser no of participants for training and the high dropout ratio during the program. To overcome the above difficulties they expanded this program to rural areas such as Dehiattakandiya, Hambanthota to attract rural unoccupied youth on this program. Also, awareness campaigns were organized to raise understanding regarding the necessity for technical education & vocational training in the present construction industry. In rural areas the number of participants for the program was low and dropouts during the program were high.

Although private companies invest in the skill development of laborers, most of the time they are not retained with the same company. Once skilled laborers received a higher salary, they are changing the company without considering the investment cost of the

company. Hence, construction companies are providing training as a corporate social responsibility (CSR) program rather than direct investment.

Hence, providing training and providing sufficient salary during the training period is important. If the government can conduct necessary arrangements to provide sufficient salary during the training period for laborers that will be beneficial. This will help to improve the systematically trained skilled labor force of the construction industry as well as it will increase the satisfaction of skilled laborers.

4.4.2.7 Provide Service Letter at the End of Employment and Make it as Beneficial Document for Next Employment

Service letter is considered as a very important document and it includes the details of work carried out during the employment period, roles and responsibilities, etc. In most careers, a service letter is provided at the end of the employment.

It is beneficial for obtaining a new job under another employer.

In the Sri Lankan construction industry, there is no such practice to issue service letters to skilled laborers.

Issuing of service letter at the end of the employment period and make it a beneficial document for the next employment was one of the requests made by skilled laborers to improve the satisfaction of the career.

There may be some practical difficulties to issues such document due to various reasons such as temporary nature of employment, etc.

Such practical difficulties can be solved by implementing some regulations such as the implementation of minimum service period in order to issue service certificate etc.

Those steps will retain skilled laborers with construction companies as well as it will increase the status of the career.

This will automatically improve the satisfaction of skilled laborers.

Chapter 05

5 Conclusion and Recommendations

5.1 Introduction

The construction industry plays a big role in the development of the economy in Sri Lanka. There is a large number of investment projects in Sri Lanka following the civil war such as high-rise buildings, highways, roads, ports, water sector projects, etc.

With the development of the construction industry, there are lots of challenges to overcome. The skilled labor shortage is one of them because the construction industry is an industry that is highly dependent on the performance of skilled laborers.

Due to the unavailability of sufficient skilled laborers, many construction projects end up with a lot of issues.

There are few research studies done in Sri Lanka as well as other countries to find out the suitable solution for the skilled labor shortage in the construction industry.

At the moment there are still considerably skilled labor shortages in the Sri Lankan construction industry.

The main objectives of the research were:

- To Investigate the causes of skilled labor shortage in the construction industry in Sri Lanka
- To Propose suitable measures to minimize the skilled labor shortage in the construction industry in Sri Lanka

5.2 Limitations of the Research

The population of the skilled labor force in the Sri Lankan construction industry is a vast area. Due to the limitations of available resources, it was difficult to cover the entire population for the study.

Hence the scope of the research was limited to building construction projects in Colombo which were carried out by construction companies which has the highest CIDA accreditation for the building construction field.

A questionnaire survey was conducted among the skilled laborers of the above sites. During the analysis of the results, it was observed that most of the respondents are not directly employed under above mentioned main contractors. Hence results indicated in this study may not fully represent the above companies.

One of the main challenges faced during this study was to collect data from respondents. Initially, it was planned to collect sixty responses representing all the construction companies that have the highest CIDA accreditation in the building construction field. Thirty-one responses were received from the respondents after several follow-up calls. Respondents represent four construction companies that have CS2 CIDA accreditation for the building construction field.

The study was done with the participation of Sri Lankan skilled laborers only. Issues that foreign skilled laborers face while working in the Sri Lankan construction industry may differ from the outcomes of this research study.

5.3 Main Conclusions of the Research

Based on the data analyses which were done through a questionnaire survey conducted among the skilled laborers of the construction industry, the following conclusions were made.

Causal factors for dissatisfaction/Reduction of satisfaction of Skilled Laborers at sites were ranked using the relative importance index. Factors which has the relative importance index above the average were considered as the most important factors. The above factors are given below.

Table 7- Most Important Causal Factors

Causal Factor	Ranking
Uncertainty in employment	1
Low pay compared to the bitterness of the job	2
No clear career path and career development	3
Lack of health insurance provided by the company	4
Having to work long hours	5
Higher bitterness of the job compared to other available career opportunities	6
Lower recognition by the society for the career	7
Having less freedom than other industries (Lack of holidays/lack of freedom to spend time with families)	8
Failure to receive appreciation for the work by Supervisor or senior staff	9

These are the main reasons for not attracting workers for the Sri Lankan construction industry as skilled laborers. This has created skilled labor scarcity in the construction industry.

Further, Changes that are expected by skilled laborers at sites for improving the satisfactory levels were ranked using the relative importance index. Expected changes which have the relative importance index above the average were considered as the most important changes. Above expected changes are given below.

Table 8 - Most Important Changes for Improving the Satisfactory Levels

Changes Expected by Skilled Laborers	Rank
Increase day salary and overtime rate	1
Allow working more overtime hours	2
Introduce new technological equipment for site works and provide training for the same	3
Introduce new safety devices to sites and provide training for the same	4
Provide better health insurance facilities	5
Provide training opportunities and provide sufficient salary during training	6
Provide a service letter at the end of employment and make it a beneficial document for next employment	7

Detailed discussions about the above factors were explained in previous chapters.

If the above factors are addressed correctly, most of the problems with skilled labor in the construction industry may solve and it will attract/retain skilled laborers in the construction industry. It will automatically reduce the skilled labor shortage in the construction industry.

5.4 Recommendations for Future Studies

The study was conducted to reduce the skilled labor shortage that exists within the Sri Lankan construction industry.

In construction sites, there is a shortage of unskilled laborers as well. Most of the factors discussed above may be applicable to them as well. It will be useful to research with the participation of unskilled laborers to check the applicability of the above-discussed factors to them.

The study area was limited to the building projects in Sri Lanka which were carried out by the construction companies which has the highest CIDA accreditation in the Building construction field. Since the population of the skilled Labors refers to a vast area that will be useful to conduct studies representing the entire population or another subset of it.

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Appendix A – Questionnaire Sample

ශ්‍රී ලාංකික ඉදිකිරීම් ක්ෂේත්‍රයේ පුහුණු කම්කරු ශ්‍රම හිඟය හඳුනා ගැනීම සහ අවම කිරීම සඳහා අධ්‍යයනය

මෙම ප්‍රශ්නාවලිය කොටස් තුනකින් සමන්විත වේ. සෑම ප්‍රශ්නයකට ම ඔබගේ දැනුමේ ප්‍රමාණය පරිදි නිවැරදිව පිළිතුරු සපයන්න.

ඔබ සපයන තොරතුරු මෙම අධ්‍යයනය සඳහා පමණක් භාවිතා කරන අතර එම තොරතුරු වල රහස්‍ය භාවය සුරකින්නෙමු.

ප්‍රශ්නාවලි කොටස් 01- මූලික තොරතුරු

01) ඔබගේ වයස කොපමණ ද?

02) ඔබගේ ස්ථීර පදිංචිය කොහේද?

03) ඔබ විවාහක ද?

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04) ඔබට දූ දරුවන් සිටී ද?

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05) ඔබ මෙම රැකියාවේ පූර්ණ කාලීන වශයෙන් වසර පුරාම නියැලෙන්නේද?

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06) එසේ නියැලෙන්නේ නොවේ නම් ඔබගේ වෙනත් රැකියා කවරේ ද?

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07) ඔබ කොතෙක් දුරට අධ්‍යාපනය ලබා ඇති ද?.....

08) ඔබ මෙම ක්ෂේත්‍රයේ විධිමත් පුහුණුවක් ලබා ඇති ද?

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09) එසේ ලබා ඇති නම් ඒ කුමන ආයතනය ද කොතෙක් දුරට ද?

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10) ඔබ ලැබූ පුහුණුව ඔබගේ රැකියාවට අවශ්‍ය නිපුණතා සංවර්ධනය සඳහා ප්‍රමාණවත් වූයේ ද?

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11) වර්තමානයේ ඔබ කුමන ප්‍රභේදයකට අයත් රැකියාවේ යෙදෙන්නේ ද?

පෙදරේරු

කම්බි බැඳීම

ෂචරීන් කාර්මික

වෙනත් (සඳහන් කරන්න)

12) ඔබ මෙම ක්ෂේත්‍රයේ කොපමණ කාලයක් සේවයේ යෙදී ඇතිද?

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13) වර්තමානයේ ඔබගේ මාසික වැටුප කොපමණද (අතිකාල දීමනා සමග)?

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14) ඔබ මේ වන විට රැකියාව කරන්නේ ප්‍රධාන කොන්ත්‍රාත් සමාගම ස්ථීර කම්කරුවෙක් වශයෙන් ද උප කොන්ත්‍රාත් කරුවකු යටතේ ද මුන්පවර් ආයතනයක් යටතේ ද?

ප්‍රධාන කොන්ත්‍රාත් සමාගම ස්ථීර/දිගු කාලීන කම්කරුවෙක් වශයෙන්

උප කොන්ත්‍රාත් කරුවකු යටතේ

මුන්පවර් ආයතනයක් යටතේ

15) ඔබ මෙම රැකියාව නවදුරටත් ඉදිරියට කරගෙන යාමට බලාපොරොත්තු වන්නේ ද?

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16) එසේ නොමැති නම් ඒ සඳහා හේතු මොනවා ද?

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ප්‍රශ්නාවලි කොටස් 02 - වැඩබිමේ දැනට පවතින තත්වය අධ්‍යයනය

01) ඔබ මෙම රැකියාවේ නියැලෙන්නේ තෘප්තිමත් බවකින් ද ?

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ඔබගේ රැකියාවේ තෘප්තිමත් භාවය අඩුවීම සඳහා පහත සඳහන් කරුණු කොතෙක් දුරට බලපා ඇති ද ?

5 - ඉතාමත් බලපා ඇත

4 - තරමක් දුරට බලපා ඇත

3 - මධ්‍යස්ථ කරුණකි

2 - බලපා නැත

1 - කිසිසේත් බලපා නැත

01	ඔබ සිදු කරන කාර්යය පිළිබඳව සුපවයිසර් මහතුන්ගේ හෝ ඉහළ කාර්ය මණ්ඩලයෙන් ඇගයීමක් නොලැබීම	5	4	3	2	1
02	සුපවයිසර් මහත්වරුන් ගේ සහ ඉහළ මණ්ඩලයේ දෝෂදර්ශනයට ලක්වීම	5	4	3	2	1
03	අධික දිගු පැය ගණනක් වැඩ කිරීමට සිදුවීම	5	4	3	2	1
04	කෙටි කාලයක් තුළ වැඩ වෙන්වීමේ ස්ථාන වෙනස් වීම නිසා තැනින් තැනට ගමන් කිරීමට සිදුවීම	5	4	3	2	1
05	ප්‍රමාණවත් නවාතැන් පහසුකම් නොමැති බව	5	4	3	2	1
06	වැඩබිමේ සිට නවාතැන්පල දක්වා නිසි ප්‍රවාහන පහසුකම් නොමැතිවීම	5	4	3	2	1
07	වැඩ බිමේ පවතින දුර්වල වටපිටාව (උදාහරණ වැසිකිළි පහසුකම් අවම වීම ආහාර ගැනීමට නිසි පහසුකම් නොලැබීම)	5	4	3	2	1
08	අනෙක් රැකියාවලට වඩා රැකියාවේ ඇති කටුක බව	5	4	3	2	1
09	රැකියාවේ ඇති කටුක බවට සාපේක්ෂව ගෙවීම අඩුකම	5	4	3	2	1
10	රැකියාවට සමාජයෙන් ඇති අඩු පිළිගැනීම	5	4	3	2	1

11	වැඩබිම් තුළ රාජකාරී කිරීමේදී ආරක්ෂාව සම්බන්ධ ගැටලු නිසා ඇති වන ජීවිත අවදානම	5	4	3	2	1
12	අනෙක් රැකියාවලට වඩා රැකියාවේ ඇති නිදහස අවම වීම උදාහරණ (අවශ්‍ය දිනවල දී නිවාඩු ලබා ගැනීමට නොහැකි වීම)	5	4	3	2	1
13	රැකියාවේ පවතින අවිනිශ්චිත බව	5	4	3	2	1
14	රැකියාවේ දියුණුවක් ඉදිරි ගමනක් නොමැති වීම	5	4	3	2	1
15	රැකියාව පිළිබඳ අත්දැකීම් අඩු බව සහ ප්‍රමාණවත් පුහුණුවක් නොලැබීම	5	4	3	2	1
16	වැඩබිම් වල කාර්යන් සඳහා නව තාක්ෂණික උපකරණ ඇති නමුත් ඒවා සඳහා පුහුණුවක් නොතිබීම	5	4	3	2	1
17	රැකියා ස්ථානයෙන් රක්ෂණ පහසුකම් ලබා නොදීම	5	4	3	2	1
18	ඔබ රැකියාවේ නියලෙන්නේ පූර්ණ කාලීනයකු වශයෙන් නොවීම	5	4	3	2	1
19	ඔබගේ රැකියාව පිළිබඳ පවුලේ සාමාජිකයන්ගෙන් ඥාතීන්ගෙන් ඇති අකමැත්ත	5	4	3	2	1
20	වෙනත් කරුණු ඇත්නම් පහතින් සඳහන් කරන්න	5	4	3	2	1

ප්‍රශ්නාවලි කොටස් 03 - වැඩබිම් වල සිදුකලයුතු වෙනස්කම් අධ්‍යයනය

පහතින් සඳහන් වෙනස්කම් ඔබගේ වැඩබිම් වල සිදු කලහොත් එය කෙසේ ඔබගේ තෘනීමත් භාවයට බලපානු ඇතිද?

- 5 - ඉතාමත් ඵලදායී වේ 😄
- 4 - සාමාන්‍ය ලෙස ඵලදායී වේ 😊
- 3 - මධ්‍යස්ථ කරුණකි 😐
- 2 - ඵලදායී නො වේ ☹️
- 1 - කිසි සේත්ම ඵලදායී නොවේ 😞

01	වැඩි පැය ගනනක් අතිකාල දීමනා ලෙස වැඩ කිරීමට අවස්තාව ලබා දීම	5	4	3	2	1
02	දෛනික ගෙවීම් සහ අතිකාල දීමනා වැඩි කිරීම	5	4	3	2	1
03	Shift ක්‍රමයට වැඩ කිරීමට අවස්තාව ලබා දීම	5	4	3	2	1
04	ටාගට් ඕට් ක්‍රමයට වැඩ කිරීමට අවස්ථාව සලසා දීම	5	4	3	2	1
05	ඔබගේ නිපුණතා පිළිබඳ නිසි ඇගයීමක් සිදු කිරීම සහ ඒ අනුව වැටුප් වැඩි කිරීම	5	4	3	2	1
06	වැඩ බිමේ පවතින වටපිටාව වැඩිදියුණු කිරීම (උදාහරණ වැසිකිළි පහසුකම්/ආහාර ගැනීමට නිසි පහසුකම් ලබාදීම)	5	4	3	2	1
07	උප කොන්ත්‍රාත් කරුවකු යටතේ නොව ප්‍රධාන කොන්ත්‍රාත් සමාගමක ස්ථීර/දිගු කාලීන කම්කරුවෙක් වශයෙන් වැඩ කිරීමට අවස්තාව ලබා දීම	5	4	3	2	1
08	පුහුණු වීම් අවස්තා ලබා දීම සහ පුහුණු කාලසීමාව තුලදී ප්‍රමාණවත් වැටුපක් ලබාදීම	5	4	3	2	1
09	රැකියාව අත්දැකීම් සමග උසස් වීම් ලබාදීම (උදා: කාලයත් සමග ෆෝමන්/ සුපර්වයිසර් ආදී තනතුරු ලබා දීම)	5	4	3	2	1

10	ඔබ එක් කොන්ත්‍රාත් කරුවකු යටතේ සේවය අවසන් කර යන අවස්තාවේදී ඔබගේ සේවය අගයා සහතිකයක් ලබාදීම සහ වෙනත් කොන්ත්‍රාත් කරුවකු යටතේ සේවය කිරීමට යාමේදී එම සහතිකය පෙන්වා වඩා හොඳ අවස්තා ලබා දීම	5	4	3	2	1
11	වැඩබිම් වල කාර්යන් සඳහා නව තාක්ෂණික උපකරණ ලබා දීම සහ ඒවා සඳහා පුහුණුවක් ලබා දීම	5	4	3	2	1
12	රැකියා ස්ථානයෙන් ප්‍රමාණවත් පරිදි රක්ෂණ පහසුකම් හඳුන්වා දීම	5	4	3	2	1
13	වැඩබිම් වල කාර්යන් සඳහා නව ආරක්ෂිත උපකරණ ලබා දීම සහ ඒවා සඳහා පුහුණුවක් ලබා දීම	5	4	3	2	1
14	වෙනත් කරුණු ඇත්නම් පහතින් සඳහන් කරන්න	5	4	3	2	1

Appendix B – Relative Importance Index Values of Casual Factors

Relative Importance Index Values of Casual Factors

Item No	Causal Factor	RII
1	Failure to receive appreciation for the work by Supervisor or senior staff	0.56
2	Verbal harassment at workplaces by Supervisor or senior staff	0.53
3	Having to work long Hours	0.57
4	Need for traveling from location to location due to Worksite location changes within a short period	0.45
5	Non-availability of proper site accommodation	0.47
6	Non-availability of transportation facilities between site and accommodation	0.50
7	Poor environmental conditions at Workplaces (Ex: No sanitary facilities, no proper location for meal arrangement, etc.)	0.50
8	Higher bitterness of the job compared to other available career opportunities	0.57
9	Low pay compared to the bitterness of the job	0.65
10	Lower recognition by the society for the career	0.57
11	The high degree of life risk due to safety issues at the site	0.52
12	Having less freedom than other industries (Lack of holidays/lack of freedom to spend time with families)	0.56
13	Uncertainty in employment	0.65
14	No clear career path and career development	0.64
15	Not having adequate work experience and sufficient training has not been provided by companies	0.54
16	Although new technological equipment available at the site there is no proper training for the same	0.49
17	Lack of health insurance provided by the company	0.60
18	Working in the construction industry as a part-time worker	0.49
19	Family members do not like this career	0.45

Appendix C – Relative Importance Index Values of Expected Changes

Relative Importance Index Values of Expected Changes

Item No	Changes Expected by Skilled Laborers	RII
1	Allow working more overtime hours	0.98
2	Increase day salary and overtime rate	0.98
3	Allow working multiple shifts	0.71
4	Allow working as target overtime schedules	0.86
5	Assess skills properly and increase salary accordingly	0.90
6	Improve environmental conditions at Workplaces (Ex: sanitary facilities, the proper location for meal arrangement, etc.)	0.86
7	Make better employment under the main contractor rather than under sub-contractor or manpower supplier	0.88
8	Provide training opportunities and provide sufficient salary during training	0.94
9	Provide promotions with the work experience (Ex: Provide designations such as Forman, a technical officer with the work experience)	0.86
10	Provide a service letter at the end of employment and make it a beneficial document for next employment	0.92
11	Introduce new technological equipment for site works and provide training for the same	0.97
12	Provide better health insurance facilities by the company	0.95
13	Introduce new safety devices to sites and provide training for the same	0.95