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Organisational Elements Controlling the Labour Efficiency in Sri Lankan Road Construction Projects: Engineers' Perspective

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Abstract: Labour efficiency is crucial for a construction firm's long-term viability. According to recent studies, modernising organisational and administrative procedures is essential to improving labour efficiency in many developing countries, including Sri Lanka. The perspectives of construction engineers play a key role in strengthening organisational policies and management practices in the construction industry. As a result, based on the viewpoint of construction engineers, this study aims to identify the critical organisational elements that highly influence labour efficiency in Sri Lankan road construction projects. The elements/factors were qualitatively discovered after a thorough literature review. Then, a questionnaire survey was conducted among construction engineers employed by 31 Sri Lankan road construction contractors. The Relative Importance Index (RII) method was used to quantify each element's level of influence on labour efficiency. Based on RII values, 33 organisational elements were determined as critical, where lack of communication and cooperation between the parties, delay in salary payment and lack of labour training facilities were determined as the top three ranking elements in the list. The validity and reliability of the results were confirmed by additional statistical tests. Using problem-based communication strategies, industry consultations were conducted among construction experts to determine the necessary future measures from relevant authorities based on the identified critical elements. These consultation outcomes suggest that the organisational policies of construction enterprises currently in place addressing financial procedures, communication strategies, resource management, performance management and training development practices must be improved in light of the new normal conditions facing the industry. The study findings might help to close the gap between management/organisational policies and workforce practices. Despite the fact that the study findings are limited to the Sri Lankan road construction industry, some of them could be used to address comparable issues in other developing nations.

Keywords: Construction, developing countries, organisational factors, efficiency, productivity, road projects

1. Introduction

The expansion of the construction industry has a substantial impact on the development of a country's infrastructure facilities (Halwatura, 2015), leading to achieving the socioeconomic goals of a nation (Silva et al., 2018). The construction industry makes a significant contribution to the GDP of many countries, particularly 9% in Oman, 6.1% in the UK and 5.5% in Japan (Umar, 2021). When it comes to Sri Lanka, it was 6% in the recent scenario as per the consultation with Construction Industry Development Authority (CIDA). According to Manoharan et al. (2021a, 2022), Sri Lanka is one of many developing countries where the construction industry has grown rapidly in recent decades. As a result, numerous jobs have been created for a number of occupational sectors, and it is anticipated that this tendency will continue for some time (Manoharan et al., 2022).

The construction industry of any nation should focus its efforts primarily on improving operational efficiency in order to attain anticipated profitability (Ghate & Minde, 2019). However, productivity issues have plagued the construction sector in many developing countries, slowing down the physical pace of construction projects (Ghoddousi et al., 2015; Montaser et al., 2018; Silva et al., 2018). Numerous studies show that a number of organisational problems are the main causes of productivity loss in the construction sector of those countries (Soham & Rajiv, 2013; Onyekachi, 2018; Dinh & Nguyen, 2019; Murari & Joshi, 2019; Manoharan et al., 2020). Notably, low labour productivity has been one of the major factors contributing to construction delays in many developing nations (Kesavan et al., 2014).

To produce the intended profits from any construction project, it is often essential to establish effective control over the organisational components that go through the integrated production composition (Shehata & El-Gohary, 2011). Organisational policies have a substantial impact on how resources are managed, which affects how quickly tasks are completed, how much money is saved and how much and how well products are produced (Ghate & Minde, 2019). One of the important components of resource management methods is administrative procedures, and in particular, construction administration is the key element in supplying the fuel to drive construction project operations by handling a variety of tasks (Kesavan et al., 2015). As a result, improving current construction management methods along with organisational policies and administrative practices is crucial for construction enterprises in many developing countries like Sri Lanka to address the opportunities and problems connected to productivity (Shehata & El-Gohary, 2011; Shahab & Audrius, 2018; Ghate & Minde, 2019). Notably, the consultations with the Sri Lankan Construction Industry Development Authority (CIDA) officials reveal that both the government and the private sectors invest more in road construction under infrastructure development and the lack of studies focused on productivity factors for the road construction sector in Sri Lanka.

1.1 Study Aim and Significance

As per the above-stated aspects, this study aims to pinpoint the critical organisational and managerial practices that affect labour efficiency in road construction projects in Sri Lanka. This study is limited to the perspectives of construction engineers and understands that construction engineers are significant resources who can play a central role in decision-making processes to upgrade organisational and management policies in construction operations. At its beginning, the study qualitatively detects the significant organisational and managerial elements that influence labour efficiency in road construction projects. Additionally, it attempts to quantify the degree to which such factors affect the effectiveness of labour operations and to identify the necessary future actions by relevant authorities to improve the existing organisational practices. This will support the construction industry's ability to overcome productivity-related obstacles brought on by the industry's new normal issues in many emerging countries.

2. Literature Review

Construction projects cannot proceed as planned when project financing is insufficient (Shahab & Audrius, 2018). According to earlier studies, the financial difficulties of clients significantly impeded the physical advancement of construction projects in India (Murari & Joshi, 2019), Indonesia (Soekiman et al., 2011), Iran (Shahab & Audrius, 2018) and Palestine (Mahamid, 2013). On the other hand, Durdyev et al. (2013) asserted that low productivity levels of construction operations in various construction projects in Turkmenistan were caused by the government's poor financial management and the contractors' financial fragility. Due to inaccurate financial-related issues, low remuneration and salary delays were identified as the primary problems limiting worker motivation in the construction industry in numerous nations (Chigara & Moyo, 2014; Robles et al., 2014; Ghoddousi et al., 2015; Windapo, 2016; Zannah et al., 2017; Shahab & Audrius, 2018; Silva et al., 2018; Mistri et al., 2019; Murari & Joshi, 2019). Notably, the varied salary payment procedures in Egypt's construction industry were to blame for the unhappiness of the workforce (Dinh & Nguyen, 2019).

Recent studies highlight the lack of attention given by construction organisations to offering training opportunities and enhancing workers' abilities in the global construction industry (Kesavan et al., 2014; Ghoddousi et al., 2015; Zannah et al., 2017; Silva et al., 2018; Ghate & Minde, 2019; Mistri et al., 2019). Due to skill shortages and a lack of work experience, the primary causes of the poor productivity level of construction activities in many nations have been

identified (Dharani, 2015; Kesavan et al., 2014; Montaser et al., 2018; Silva et al., 2018; Dinh & Nguyen, 2019; Murari & Joshi, 2019). Skills shortages have an impact on construction project quality of work operations as well (Saurav et al., 2017; Onyekachi, 2018; Shahab & Audrius, 2018). Studies show the need for efficient training programmes that improve the abilities and characteristics of workers and supervisors (Onyekachi, 2018; Shahab & Audrius, 2018; Dinh & Nguyen, 2019; Murari & Joshi, 2019). Importantly, supervision techniques, which act as a vital link between management and labour, can considerably increase the efficacy and productivity of construction labour operations (Onyekachi, 2018; Dinh & Nguyen, 2019; Manoharan et al., 2022).

A few decades ago, the advancement of various construction projects in the United Kingdom was particularly hindered by inexperienced supervisors working on the job sites (Paul, 2002). In Zambia, the main obstacles to effectively supervising construction projects were the supervisors' incapacity to deal with technical issues (Muya et al., 2003). On the other hand, the poor work processes of the supervisors, supervisor absenteeism and their weak resource management skills were determined as the key problems for the Indonesian contractors (Soekiman et al., 2011).

It was discovered that unclear instructions given to workers and ineffective communication between the parties impeded several construction projects in Indonesia (Soekiman et al., 2011). Studies show that ineffective interparty communication reduces the efficiency of construction projects in a number of countries, including India (Ghate & Minde, 2009), Nigeria (Olabosipo et al., 2011), Palestine (Mahamid, 2013), Qatar (Jarkas et al., 2012) and Sri Lanka (Halwatura, 2015). According to Shashank et al. (2014), a lack of site meetings and poor labourer instructions have caused productivity issues for several Indian construction enterprises. Moreover, poor decision-making and weak supply chain management techniques of construction organisations have contributed to productivity challenges in the Indian construction industry (Saurav et al., 2017).

A considerable number of construction projects in India (Mistri et al., 2019), Qatar (Jarkas et al., 2012) the United Arab Emirates (Ailabouni et al., 2009) and Zimbabwe (Chigara & Moyo, 2014) have observed inadequate efficiency of construction operations as a result of poor management practices of construction organisations. The efficiency of the labour force on construction projects in Qatar was demonstrated to be impacted by a lack of transportation facilities (Jarkas et al., 2012), whilst Halwatura (2015) asserted that the lack of food, lodging and medical care facilities had an impact on Sri Lankan construction projects. Some studies have emphasised the need for industrial research applications at the organisational level among construction enterprises to identify the trouble spots in the management strategies and aforementioned infrastructure (Olabosipo et al., 2011; Adi & Ni'am, 2012). Table 1 provides a complete evaluation of previous studies on organisational and management practices and the related factors influencing labour efficiency in various developing nations.

Table 1 - Recent studies from various developing countries focusing investigated the organisational elements affecting the efficiency of construction labour

| Country | Studies |
|----------------------|---|
| India | Soham and Rajiv (2013); Dharani (2015); Sangole and Rani (2015); Saravanan and Surendar (2016); Thiyagu and Dheenadhayalan (2016); Dixit <i>et al.</i> (2017); Patel <i>et al.</i> (2017); Saurav <i>et al.</i> (2017); Singh <i>et al.</i> (2017); Ghate and Minde (2019); Mistri <i>et al.</i> (2019); Murari and Joshi (2019); Agrawal and Halder (2020); Saurav and Kaaraayarthi (2020) |
| Indonesia | Soekiman <i>et al.</i> (2011); Adi and Ni'am (2012) |
| Iran | Shahab and Audrius, (2018); Ghoddousi <i>et al.</i> (2015); Ghoddousi and Hosseini (2012) |
| Nigeria | Ayegba and Agbo (2014); Oseghale <i>et al.</i> (2015); Okoye <i>et al.</i> , (2016); Zannah <i>et al.</i> (2017); Onyekachi (2018) |
| Palestine | Mahamid (2013) |
| South Africa | Rasool and Botha (2011); Windapo (2016); Oke <i>et al.</i> (2018); Orando and Isabirye (2018) |
| Sri Lanka | Kesavan <i>et al.</i> (2014); Halwatura (2015); Kesavan <i>et al.</i> (2015); Fernando <i>et al.</i> (2016); Silva <i>et al.</i> (2018); Manoharan <i>et al.</i> (2020) |
| Trinidad and Tobasco | Hickson and Ellis (2013) |
| Turkey | Kaya <i>et al.</i> (2014); Kazaz <i>et al.</i> (2016) |
| Turkmenistan | Durdyev <i>et al.</i> (2013) |
| Vietnam | Dinh and Nguyen (2019) |
| Zimbabwe | Chigara and Moyo (2014) |

2.1 Sri Lankan Context

A few studies have examined the factors affecting construction productivity and efficiency in Sri Lanka. The most labour-related issues in Sri Lanka's construction industry were found to be a lack of workers, interpersonal conflicts among workers, low motivation and morale among workers, a lack of experience among workers and work-related

injuries, according to Kesavan et al. (2015). On the other hand, Widanagamachchi (2013) noted that the temporary nature of the job, the demanding work environment and the lack of social recognition were the main contributors to the lack of worker motivation in Sri Lankan construction projects. According to Fernando et al. (2016), the majority of Sri Lankan construction firms do not use an appropriate system for evaluating the performance of their workforce. Furthermore, Halwatura (2015) identified the primary organisational variables influencing labour productivity in Sri Lankan construction projects as being insufficient supervision, a lack of medical care facilities, issues with overtime, a lack of job security, issues with payments and inadequate communication.

Despite the fact that relatively few studies have focused on improving the efficiency of construction operations, Manoharan et al. (2020) have comprehensively identified a wide range of factors that significantly affect the performance and productivity of construction operations in the Sri Lankan construction industry. A total of 41 factors were identified by Manoharan et al. (2020) while taking into account contemporary management and organisational practices. To qualitatively identify these traits, Manoharan et al. (2020) carried out an extensive literature study and a series of structured interviews. Manoharan et al. (2020) used well-known internet search engines and library resources to select potential research publications based on their reputation and impact scores, as recommended in the method by Schweber & Leiringer (2012). Manoharan et al. (2020) also conducted interviews with construction workers from the Sri Lankan construction industry in a variety of working categories because there were not many recent studies that looked into labour efficiency in the Sri Lankan construction sector. This was performed in consideration of the importance of understanding the current/recent practices of the industry. The current study has evaluated the organisational factors presented by Manoharan et al. (2020) and filtered those, considering their suitability and practicality in road construction project practices.

Table 2 shows the comparison results of the current study with other recent studies from foreign contexts in relation to the organisational elements affecting the efficiency of construction operations. The mapping results confirm the need to use quantitative methodologies while taking into account each of the factors stated in Table 2.

Table 2 - Significant organisational elements affecting the efficiency of construction labour in various developing countries

| Code | Organisational Elements | Past Studies from Different Countries | | | | | | | | | | | |
|------|---|---------------------------------------|-----------|------|---------|-----------|--------------|-----------|---------------------|--------|--------------|---------|----------|
| | | India | Indonesia | Iran | Nigeria | Palestine | South Africa | Sri Lanka | Trinidad and Tobago | Turkey | Turkmenistan | Vietnam | Zimbabwe |
| O1 | Too many types of salary payment | | X | | | | | | | | | X | |
| O2 | Delay in salary payment | X | | X | X | | X | X | X | | | | X |
| O3 | Low salaries for labourers | X | | X | X | | X | X | X | | | | X |
| O4 | Financial difficulties of the owner | X | X | X | | X | | | | | | | |
| O5 | Improper project financing | | | X | | | | | | | X | | |
| O6 | Financial weakness of the contractor | | | X | | | | | | | X | | |
| O7 | Inadequate financial policies of the government | | | X | | X | | | | | X | | |
| O8 | Lack of proper incentives | | | | X | | | X | | | | | |
| O9 | Lack of motivation for labourers | X | | X | X | | X | X | X | | | | X |
| O10 | Lack of training facilities for labourers | X | X | X | X | | X | X | X | | | | |
| O11 | No labour rewarding mechanism | | | | X | | X | X | | | | | |
| O12 | Improper promotion opportunities for labourers | | | X | X | | | | | | | | |
| O13 | Less welfare facilities for labourers | | | | X | X | | | | | | | |
| O14 | Lack of job security for labourers | X | | X | | | | X | | | | | |
| O15 | Conflicting safety policies | | | | | | | | | | | | |
| O16 | Improper work planning | X | X | X | | | | X | X | | | X | X |
| O17 | Poor supervision of labour operations | X | X | X | | | | X | X | X | | X | X |
| O18 | Poor leadership skills of supervisors | | X | | X | X | | X | | | | | |
| O19 | Poor relationship between labourers and supervisors | | X | | X | | | | | | | | |
| O20 | Poor labour management | X | X | X | | | | X | X | X | | X | X |
| O21 | Supervisor's cognitive skills | X | | | | | | X | X | | | | X |
| O22 | Supervisor's experience | X | | | | | | X | | | | | |
| O23 | Supervisor's absenteeism | | X | | | | | | | | | | |
| O24 | Inefficient site management | X | X | X | X | | | X | X | | | X | X |

| | | | | | | | | | |
|-----|---|---|---|---|---|---|---|---|---|
| O25 | Poor site coordination | X | X | X | X | X | X | X | X |
| O26 | Poor performance evaluation of labour skills | | | X | X | | | | |
| O27 | Poor resource management | X | X | | X | X | | X | X |
| O28 | Lack of communication and cooperation between the parties | | X | X | X | X | | X | X |
| O29 | Lack of periodic meeting with labourers | X | X | X | | X | X | X | X |
| O30 | Unclear instructions to labourers | | X | X | | X | X | X | X |
| O31 | Enterprise failure | | | | X | X | X | | X |
| O32 | Decision making | X | | | | | | | |
| O33 | Supply chain management | X | | | | | | | |
| O34 | Ethical behaviour of managers | X | | | X | X | | | |
| O35 | Management policies and procedures | X | | | | | | | X |
| O36 | Communication problems with foreign workers | | | | X | X | | | |
| O37 | Lack of transportation facilities | | | | | X | | | |
| O38 | Lack of industrial research on construction labour operations | | | | X | X | | | |
| O39 | Lack of medical care facilities | X | | | | X | | | |
| O40 | Lack of food facilities | X | | | | X | | | |
| O41 | Lack of accommodation facilities | | | | | X | | | |

3. Methodology

In order to evaluate how construction engineers, perceive the key elements of organizational practices influencing the effectiveness of road construction operations, the study methodology included both qualitative and quantitative approaches. The methodological progression used in this study is depicted in Fig. 1. The study also used extensive methodologies to check the accuracy and dependability of the results. These are covered in the sections that follow.

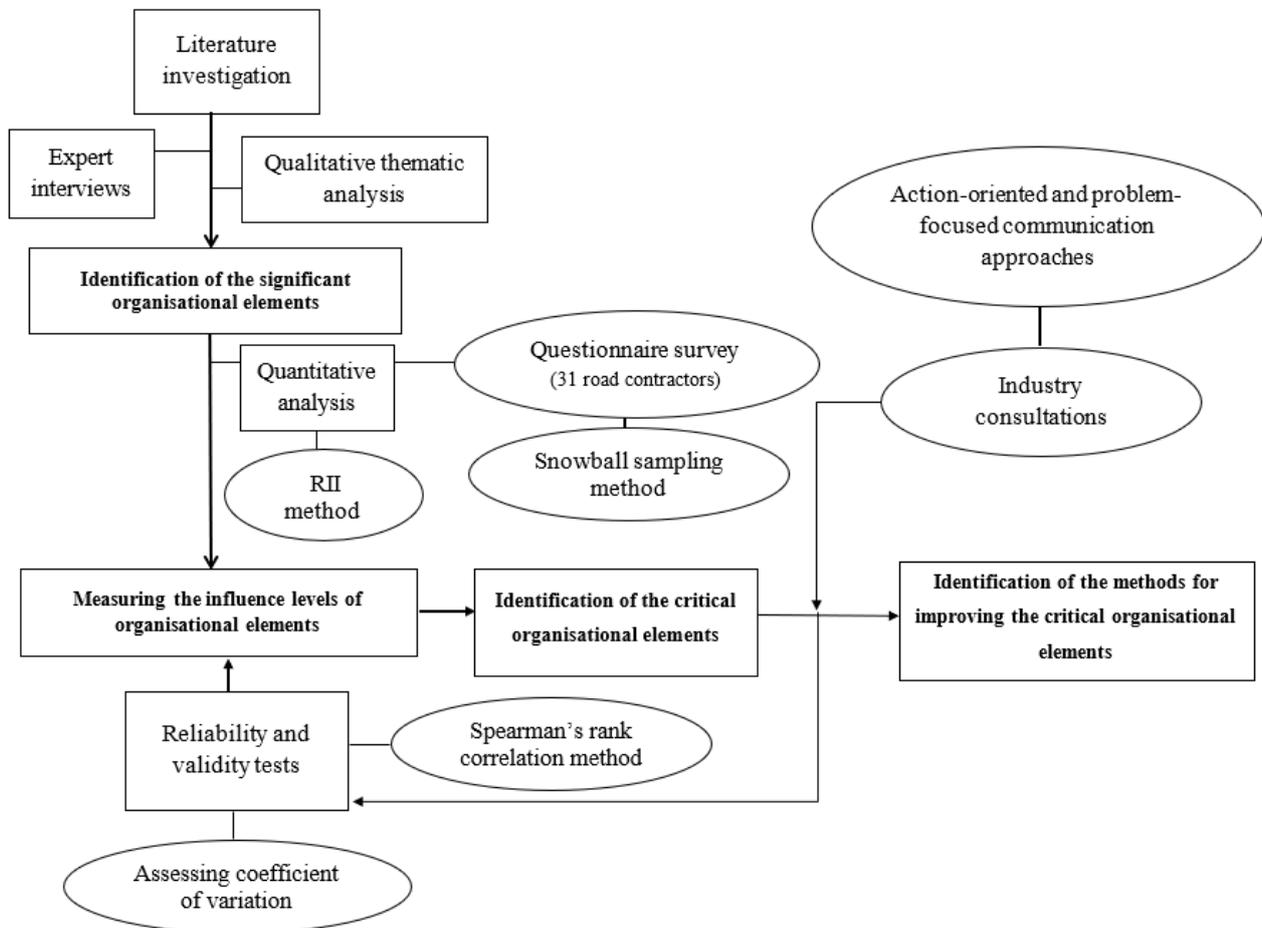


Fig. 1 - Sequential process of the study methodology

More than 15 road construction experts took part in structured interviews to verify the elements (which were identified through the literature review) with the most recent procedures in road construction projects in the Sri Lankan scenario. Project directors, team leaders, project managers, engineers, quantity surveyors and technical officers were present during these interview sessions, taking into account the professional backgrounds of those interviewees. The majority of the interviewees had work experience between five and ten years, and all had at least five years of experience in road construction projects. It is noteworthy that over a quarter of them had prior work experience abroad. Notably, more than 90% of the interviewees concurred that the current organisational practices lack to improve the effectiveness of construction operations in Sri Lanka under the current circumstances.

The thematic analysis method was used to qualitatively identify the significant organisational elements influencing construction efficiency from the data collected from the literature review and expert interviews. Using a collection of qualitative data, thematic analysis is a recognised technique for examining respondents' perspectives, knowledge, experiences, or values (Caulfield, 2019). This qualitative technique was used to examine the recurrent themes, topics, concepts and patterns in the collected data. The identified elements were examined in this qualitative thematic analysis process for specific characters, and the codes were then issued as necessary. The associated codes discovered through literature reviews and interviews were then established based on the themes created. The associated codes were used to stop the elements from being repeated. This qualitative analysis process resulted in the final set of organisational elements after a second assessment of the themes and codes. The sequential steps of the qualitative thematic analysis used in this study are depicted in Fig. 2.

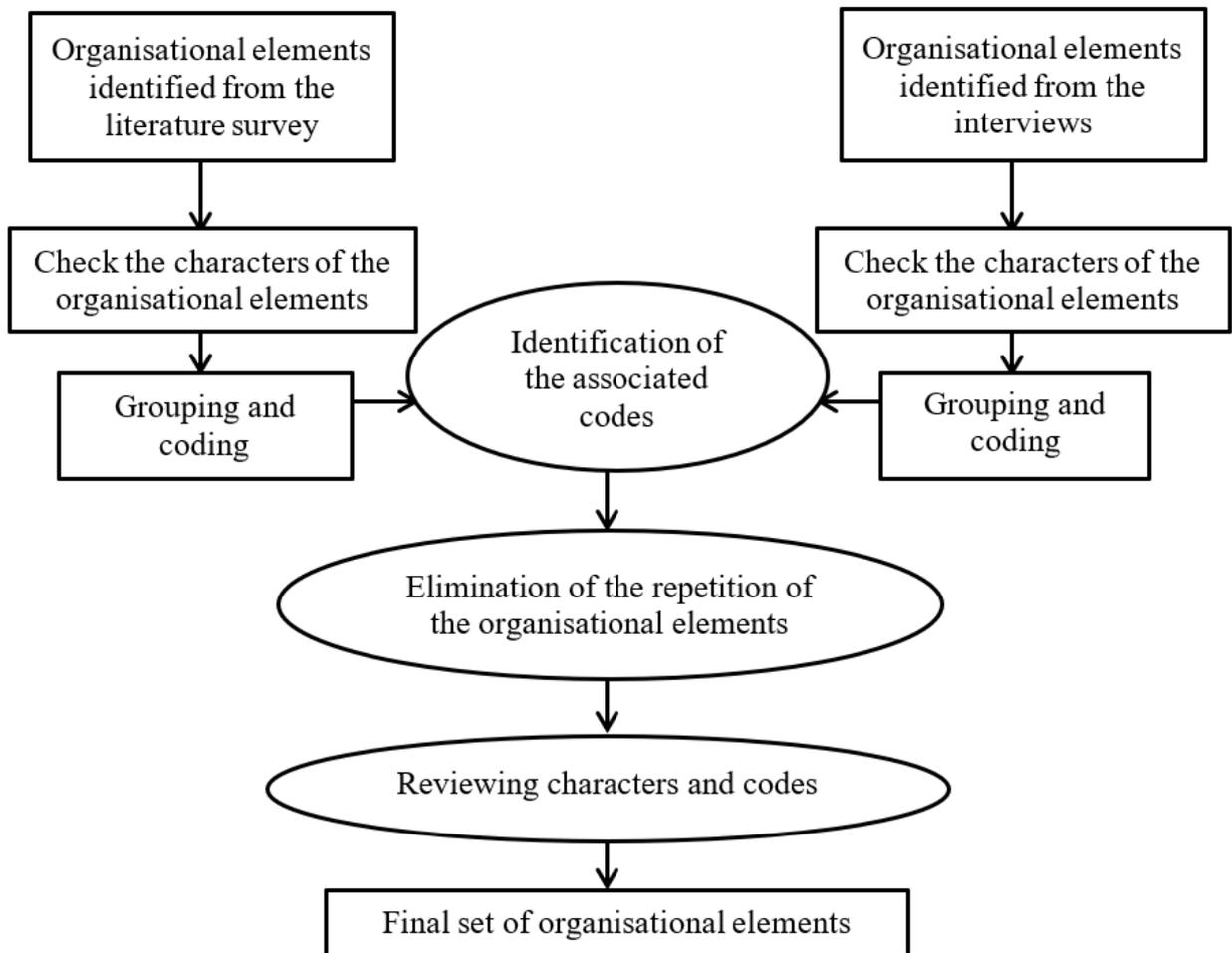


Fig. 2 - Sequential process of the qualitative thematic analysis

A questionnaire survey was conducted among construction engineers employed by 31 Sri Lankan construction firms for road construction projects. When questioned about their present organisational practices for road construction projects, a construction engineer from each of the 31 construction companies participated in this survey as a respondent. A Likert scale with five ordinal measurements ranging from 1 to 5 was used in the survey questions on the elements/factors (very low effect to very strong influence). Cognitive interviews with engineers from four different construction firms helped to validate the design of the questionnaire. The designs of the questionnaires were validated as a result of the cognitive interviews to account for the survey participants' levels of comprehension of the questions

asked. In particular, the questionnaire contained all the instructions and data required to ensure that respondents understood the purpose of the study as well as the elements related to the significance of efficiency and sustainability in construction practices.

Because it was impossible to identify the actual sample size given the objective criteria, the snowball sampling technique was used to choose respondents for the questionnaire survey, as described by Showkat & Praveen (2017). A relatively limited number of well-known individual construction organisations took part in the study’s initial phase. The survey participants were requested to supply the details of additional road construction projects of other possible firms in order to broaden the sample size.

Using the Relative Importance Index (RII) approach, the effects of the elements on the efficiency of labour activities were quantified. The RII was determined using Equation (1), as suggested by earlier studies (Kesavan et al., 2015; Dinh & Nguyen, 2019).

$$RII = \frac{\Sigma W}{A * N} \tag{1}$$

Where,

W represents the weight assigned to each element by response ranges (1 – Very low, 2 – Low, 3 – Moderate, 4 – High, 5 – Very high).

A represents the maximum weight given (A equals 5).

N represents the total number of responses.

Because of the component’s increased RII value, it is clear that construction processes are significantly more efficient. The lowest RII value to establish whether a specific element is crucial was 0.7, while the lower margin RII values for "Moderate" and "Low" degrees of effect were 0.5 and 0.3, respectively, according to relevant studies (Kesavan et al., 2015; Dinh & Nguyen, 2019; Manoharan et al., 2020). When the RII score is less than 0.3, the impact is considered to be ‘Very low’. To test the validity and reliability of the findings, the coefficient of variation (CV) value for each component was also calculated. The CV value is determined using the standard deviation to the mean ratio of the data (Solly & Gezani, 2017). In this case, the lower CV value indicates that the responses are broadly in line with the mean values. According to the Labour Force Survey Guide 2020 of Canada (Statistics Canada, 2020), the CV values should be less than 0.3 to ensure that the results are reliable for the study.

A number of meetings, workshops and consultations with construction experts from various working categories were organised in order to address the implications of the specified critical elements and the necessary actions that need to be taken by pertinent authorities. Action-oriented and problem-based communication approaches were mainly used in the discussion sessions. These consultation outcomes also supported the validity of the research findings.

4. Results and Discussion

Table 3 provides a complete profile of the survey respondents based on their CIDA grades and job experience in road construction projects. In Sri Lanka, a reputable organisation called the Construction Industry Development Authority (CIDA) provides contractor registration services. Based on their financial competence, technical abilities and work experience, the contractors are categorised into 11 grades under CIDA’s national registration and grading system (Construction Industry Development Authority, 2014). This survey only considered higher-graded construction enterprises with a minimum C4 CIDA registration grade. According to the Construction Industry Development Act No.33 of 2014, the minimum project investment amount for the C4 grade is 50 million Sri Lankan Rupees (Construction Industry Development Authority, 2014). Respondents who were C4 grade contractors made up the majority (42%). Notably, every survey respondent had at least five years of work experience in the construction sector, with the majority (45%) of respondents having between five and ten years of work experience.

Table 3 - Categorisation of survey respondents based on CIDA grade and experience in the construction field

| Profile | Variables | Number of Responses | Percentage |
|--|----------------------|---------------------|------------|
| CIDA grade of contractors (Financial limit of the projects - LKR in million) | CS2 / CS1 (X > 1500) | 04 | 13% |
| | C1 (1500 >= X > 600) | 03 | 10% |
| | C2 (600 >= X > 300) | 07 | 23% |
| | C3 (300 >= X > 150) | 04 | 13% |
| | C4 (150 >= X > 50) | 13 | 42% |
| Experience in the construction field | Less than 5 years | 00 | 00% |
| | 5–10 years | 14 | 45% |
| | 11–15 years | 08 | 26% |
| | 16–20 years | 06 | 19% |
| | 21–25 years | 03 | 10% |

More than 25 years 00 00%

The average (M), relative importance index (RII), standard deviations (SD), coefficient of variation (CV) and ranking (R) of organisational components that affect labour efficiency are shown in Table 4. Overall, 33 organisational elements were deemed critical since their RII values exceeded 0.7. Lack of communication and cooperation between the parties, delay in salary payment, lack of training facilities for labourers, too many types of salary payment, low salaries for labourers, lack of motivation for labourers, poor performance evaluation of labour skills, no labour rewarding mechanism, poor resource management and decision making were identified in the top ten list of the organisational elements affecting the labour efficiency in Sri Lankan road construction projects. This section compares the results of earlier studies from Sri Lanka and other foreign contexts to these key elements, as well as describes the factors that led to their current status, how they relate to other elements and the types of actions that the relevant organisation or authorities should take.

Table 4 - Impact levels of the elements related to organisational practices on labour efficiency in construction

| Code of Elements | Mean (M) | Relative Importance Index (RII) | Standard Deviation (SD) | Coefficient of Variation (CV) | Ranking (R) | Level of Impact (LI) |
|------------------|----------|---------------------------------|-------------------------|-------------------------------|-------------|----------------------|
| O28 | 4.21 | 0.84 | 0.17 | 0.20 | 1 | High |
| O2 | 4.18 | 0.84 | 0.15 | 0.18 | 2 | High |
| O10 | 4.18 | 0.84 | 0.17 | 0.20 | 2 | High |
| O1 | 4.13 | 0.83 | 0.18 | 0.22 | 4 | High |
| O3 | 4.13 | 0.83 | 0.16 | 0.19 | 4 | High |
| O9 | 4.13 | 0.83 | 0.18 | 0.22 | 4 | High |
| O26 | 4.13 | 0.83 | 0.17 | 0.21 | 4 | High |
| O11 | 4.00 | 0.80 | 0.16 | 0.20 | 8 | High |
| O27 | 3.97 | 0.79 | 0.15 | 0.19 | 9 | High - Moderate |
| O32 | 3.97 | 0.79 | 0.16 | 0.20 | 9 | High - Moderate |
| O14 | 3.92 | 0.78 | 0.15 | 0.19 | 11 | High - Moderate |
| O20 | 3.92 | 0.78 | 0.14 | 0.18 | 11 | High - Moderate |
| O13 | 3.90 | 0.78 | 0.12 | 0.15 | 13 | High - Moderate |
| O29 | 3.90 | 0.78 | 0.15 | 0.19 | 13 | High - Moderate |
| O30 | 3.90 | 0.78 | 0.15 | 0.19 | 13 | High - Moderate |
| O21 | 3.87 | 0.77 | 0.15 | 0.19 | 16 | High - Moderate |
| O22 | 3.87 | 0.77 | 0.14 | 0.18 | 16 | High - Moderate |
| O25 | 3.87 | 0.77 | 0.16 | 0.21 | 16 | High - Moderate |
| O12 | 3.85 | 0.77 | 0.16 | 0.21 | 19 | High - Moderate |
| O18 | 3.82 | 0.76 | 0.15 | 0.20 | 20 | High - Moderate |
| O19 | 3.82 | 0.76 | 0.14 | 0.18 | 20 | High - Moderate |
| O24 | 3.82 | 0.76 | 0.15 | 0.20 | 20 | High - Moderate |
| O15 | 3.79 | 0.76 | 0.14 | 0.18 | 23 | High - Moderate |
| O17 | 3.74 | 0.75 | 0.14 | 0.19 | 24 | High - Moderate |
| O4 | 3.69 | 0.74 | 0.15 | 0.20 | 25 | High - Moderate |
| O5 | 3.69 | 0.74 | 0.16 | 0.22 | 25 | High - Moderate |
| O16 | 3.69 | 0.74 | 0.16 | 0.22 | 25 | High - Moderate |
| O35 | 3.67 | 0.73 | 0.15 | 0.20 | 28 | High - Moderate |
| O8 | 3.62 | 0.72 | 0.13 | 0.18 | 29 | High - Moderate |
| O38 | 3.62 | 0.72 | 0.14 | 0.19 | 29 | High - Moderate |
| O23 | 3.59 | 0.72 | 0.15 | 0.21 | 31 | High - Moderate |
| O6 | 3.54 | 0.71 | 0.16 | 0.23 | 32 | High - Moderate |
| O33 | 3.54 | 0.71 | 0.16 | 0.23 | 32 | High - Moderate |
| O34 | 3.46 | 0.69 | 0.11 | 0.16 | 34 | Moderate |
| O39 | 3.33 | 0.67 | 0.11 | 0.17 | 35 | Moderate |
| O31 | 3.31 | 0.66 | 0.13 | 0.20 | 36 | Moderate |
| O37 | 3.28 | 0.66 | 0.12 | 0.18 | 37 | Moderate |
| O41 | 3.15 | 0.63 | 0.13 | 0.21 | 38 | Moderate |
| O40 | 3.00 | 0.60 | 0.12 | 0.20 | 39 | Moderate |
| O7 | 2.44 | 0.49 | 0.11 | 0.23 | 40 | Low |
| O36 | 1.74 | 0.35 | 0.12 | 0.34 | 41 | Low |

The study concludes that the failure of parties to cooperate and communicate has a detrimental effect on the progress of many road construction projects in Sri Lanka. Managing communication is the key to successful construction management especially when it comes to disseminating accurate information among project participants. Poor communication and cooperation between the parties result in low productivity and low quality in construction work, which causes a number of problems in the process, such as using the wrong construction techniques, having to redo work already done and experiencing construction delays among other things (Soekiman et al., 2011; Ghate & Minde, 2019). After considering the usual construction management practices in Sri Lanka, experts found that focus on communication management-related features should be placed in academic instruction and other occupational training programmes. Employing management strategies that properly solve concerns with communication among all varieties of construction working categories is something that construction organisations should carefully consider.

In order to prevent labourers' salary-related worries from slowing down construction activity, the study emphasises the significance of revising the organisational policies in place at many construction enterprises. Previous studies revealed that payment delays and low wages for construction labourers affected the work efficiency in many construction projects in many developing countries, including Trinidad and Tobago (Hickson & Ellis, 2013), India (Mistri et al., 2019; Murari & Joshi, 2019), Iran (Ghoddousi et al., 2015; Shahab & Audrius, 2018), Nigeria (Oseghale et al., 2015; Zannah et al., 2017). In particular, middle-level contracting companies from those countries endure these salary delays because of their fragile financial situation. Workers at construction sites suffer from low motivation and work discontent as a result, which makes them more likely to hunt for alternate means of making money. Due to employee unhappiness with their jobs, several construction projects in Iran (Ghoddousi et al., 2015) and Nigeria (Oseghale et al., 2015) have experienced productivity-related issues. The effectiveness of labour operations in numerous Indonesian construction projects was impacted by worker strikes brought on by their discontent with their jobs (Soekiman et al., 2011).

This study emphasises how organisations lack the focus on improving labour training facilities in the Sri Lankan construction sector. This shows that the problems with the lack of experience of the labour force have not been appropriately handled by the competent authorities, which has contributed to the subpar performance of the labour operations in the construction industry. Numerous other countries have also reported comparable circumstances, including India (Ghate & Minde, 2019; Mistri et al., 2019), Indonesia (Adi & Ni'am, 2012), Iran (Ghoddousi et al., 2015), Nigeria (Oseghale et al., 2015; Okoye et al., 2016; Zannah et al., 2017) and Qatar (Jarkas et al., 2012). The main determinants of how well the construction sector in each country runs are the skilled labour force and their training and education practices (Muya et al., 2003). According to recent studies, Sri Lankan school curricula do not adequately address the issues linked to construction education (Tertiary and Vocational Education Commission, 2018; Manoharan et al., 2022). The Sri Lankan Industry Sector Skills Council (ISSC) also discovered that many training programmes provided by private and public sector institutions fall short of meeting the needs of the sector (Tertiary and Vocational Education Commission, 2018). ISSC made a point of addressing the Sri Lankan labourers' poor cognitive and job-specific technical skills in current settings. Manoharan et al. (2021c) used a thorough comparison of the work-related skills between Sri Lankan labour and other leading foreign labour forces, including Arabian, Chinese, Korean and Malaysian. Manoharan et al. (2021c) highlight the need to improve the cognitive and self-management skills of Sri Lankan labourers. According to Manoharan et al. (2021c), the vocational training sector of Sri Lanka needs to pay particular emphasis to the technical abilities of labourers in equipment handling.

The findings show that low motivation among labourers is a barrier to improving the effectiveness of labour operations in road construction projects in Sri Lanka. It has also significantly affected how swiftly road construction is progressing in a number of other countries, including Nigeria (Olabosipo et al., 2011; Onyekachi, 2018), India (Soham & Rajiv, 2013; Shashank et al., 2014; Saravanan & Surendar, 2016) and Qatar (Jarkas et al., 2012). Studies highlight that the main reasons for the lack of labour motivation are a lack of job security (Dharani, 2015; Halwatura, 2015; Mistri et al., 2019), conflicting employment policies (Montaser et al., 2018), poor labour rewarding mechanisms (Windapo, 2016; Onyekachi, 2018), lack of suitable incentives (Zannah et al., 2017) and lack of promotion opportunities (Ayegba & Agbo, 2014). The findings of the current study about the Sri Lankan construction sector confirm that the industry's enterprises have not done enough to address this issue, even though earlier studies (Kesavan et al., 2015; Fernando et al., 2016) highlighted the need to enhance worker motivation. Creating organisational norms for benchmarking target achievement, assessing worker performance, rewarding labour and other welfare facilities at their organisational level should be a priority for construction organisations.

The study calls attention to the lack of organised procedures that road contractors in Sri Lanka might use to evaluate labour skills on construction sites. The low-performance appraisal of labour skills was also noted by Fernando et al. (2016) as a significant factor affecting labour efficiency in the Sri Lankan construction industry. Shehata & El-Gohary (2011) state that construction supervisory workers, engineers and managers should be knowledgeable about the proper techniques and protocols for labour performance evaluations and rewarding labourers. To make informed decisions about labour hiring, training and promotion, the construction management teams need to have systematic techniques for analysing labour performance and putting into place effective labour rewarding mechanisms.

The other major barriers to improving labour efficiency in Sri Lankan road construction projects were found to be ineffective resource management and decision-making procedures. Recent studies found that poor labour management

practices were largely to blame for the low efficiency of labour operations in a number of construction projects in Australia (Rami & David, 2014), Egypt (Montaser et al., 2018), India (Sangole & Rani, 2015; Ghate & Minde, 2019), Spain (Robles et al., 2014), Vietnam (Dinh & Nguyen, 2019) and Zimbabwe (Chigara & Moyo, 2014). Additionally, studies have shown that the ineffective leadership skills of construction managers were the main barriers to the performance improvement of construction operations in Indonesia (Soekiman et al., 2011), Nigeria (Onyekachi, 2018), Qatar (Jarkas et al., 2012) and Trinidad and Tobago (Hickson & Ellis, 2013). In order to boost construction productivity while taking into account industrial practices in the Nigerian construction sector, Onyekachi (2018) has emphasised the need for improving the interaction between labourers and construction supervisors. Past that took into account the Sri Lankan environment studies (Halwatura, 2015; Fernando et al., 2016; Manoharan et al., 2021b) also noted poor labour management practices in numerous road construction projects. Poor resource management techniques have a substantial impact on the efficiency and productivity of construction operations, yet most organisations are not doing enough to solve these problems in the Sri Lankan construction industry (Fernando et al., 2016). The need for upgrading construction supervisory training programmes in Sri Lankan construction industry was highlighted by the Tertiary and Vocational Education Commission (2018) and Manoharan et al. (2021a), with a focus on enhancing the self-management and transferable skills of construction supervisory and management level workers.

4.1 Validity and Reliability of the Results

Overall, the validity, creditability and trustworthiness of these results are assured by the CV values of each component. All CV value levels, with the exception of 'communication challenges with foreign employees (O36)' fell within the acceptable range as per the range of CV values given in the Canada 2020 Labour Force Survey Guide. It is justifiable to explain why the CV value was above average for O36. The low mean values of the component might have an effect on their high CV value. Hence, the outcomes of O36 cannot be considered irrelevant to the study's objectives, and the CV values do not indicate that they were less accurate than anticipated. The credibility of the study's conclusions was further guaranteed by the discussion materials from the workshops and consultations with representatives from the Sri Lankan road construction sector.

5. Conclusion

Based on the viewpoints of construction engineers, this study has identified the critical organisational elements that influence labour efficiency in Sri Lankan road construction projects. To improve the effectiveness of construction operations and advance toward higher productivity and profitability, the impact levels of the elements show how much attention must be paid to each element of organisational practices. The study also covered the significance of specific traits and how they impact the main activities. The significant findings of the study have been compared to past research from Sri Lanka and other overseas environments. The validity and reliability of the study findings have also been ensured using comprehensive approaches.

Overall, the study pinpoints the most important areas where construction companies need to improve their construction management processes in order to become more effective. The findings indicate that organisational policies for the construction industry need to be changed to improve the processes for managing resources, cash flow and performance. The study also emphasises the need to upgrade vocational training programmes in the industry. Based on the requirements of the industry sector, the study emphasises the topics that are not entirely addressed in the present training programmes. The study findings will be useful to the training sector of the construction industry to close the gaps between the learning outcomes of present training programmes and the expectations of the sector.

The study findings ought to motivate the construction management community to bridge the gap between management strategy and operational procedures. This might make it possible for the construction industry to successfully deal with fresh challenges and ensure its long-term survival in the face of the new normal. On the other hand, future studies need to have more focus on improving labour management and oversight practices in road construction projects. The study also recommends that effective performance evaluation systems must be implemented for the construction labourers working on road construction sites, as this would encourage worker skill development, increased work outputs and higher levels of job satisfaction. Even if the study findings can be applied and limited to the road construction sector in Sri Lanka, some of them might still be relevant to the other construction types as well as in other sectors/countries with comparable conditions.

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