

# INVESTIGATING SUITABLE SHIFT PATTERNS FOR IMPROVING WORK PERFORMANCE OF CONSTRUCTION WORKERS IN BUILDING PROJECTS IN SRI LANKA

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**Abstract:** As a substantial source of employment, the construction industry is highly dependent on labour. The failure to manage labour and the lack of performance of those labourers has negatively impacted construction cost, quality, and time. Hence, this study aims to investigate the suitable shift patterns to improve the work performance of construction workers in building projects in Sri Lanka, which was approached through a convergent mixed method. A Semi-structured interview survey was conducted with 15 project managers and a questionnaire survey was conducted with 100 skilled and unskilled labourers in building projects, to gather quantitative and qualitative data. The quantitative data was analysed using descriptive statistics, while the qualitative data were analysed through manual content analysis.

The study discussed eight shift patterns: Single shift, Double shift, Three shift, 24-hour shift, Flexible shift, Weekend shift, Staggered shift and Night Shift. It revealed differing opinions between labourers and project managers regarding shift patterns, work performance and the impact of shift patterns on the work performance of labourers. Project managers believe the Staggered Shift is the most applicable shift pattern to improve work performance while labourers believe the 24-hour shift is the most applicable shift pattern. Further, project managers emphasise that implementing a staggered shift along with a target-based approach is the best-suited method for a country like Sri Lanka to improve work performance. These findings are helpful for industry practitioners, offering insights to enhance the current work performance and productivity. Further research will explore the cost-benefit analysis of implementing different shift patterns and the role of industry professionals in their adoption and effectiveness in Sri Lanka.

**Keywords:** *Construction industry; Shift patterns; Sri Lanka; Work performance*

## 1. Introduction

As underlined by Xing et al. (2020), the construction industry incorporates complex processes with unique working conditions. It serves as a substantial source of employment and contributes significantly to the overall economic performance (Sui Pheng & Shing Hou, 2019). As mentioned by Brucker et al. (2021), construction is frequently seen as a significant investment component, which depends heavily on labour. Within this sector, manpower is the most vital and dominant productive source (Jarkas, 2015), which is an integral part of every construction project (Muqem et al., 2012). Thus, despite all the tremendous technological advancements, prevalent in the modern era, labour remains the foremost driving force within the construction sector (Jarkas, 2015).

Given the complicated nature of the construction industry, the stress level of workers has increased, which raises the necessity of addressing low levels of work performance (Hamza, 2022). The repercussion of work stress impedes an individual's ability to reach their full potential, and finally to work productively (Herrman & Llopis, 2012) which necessitates the importance of taking proactive measures to increase work performance by taking preventive actions and minimising negative causes on the mental status of labourers (Agrawal & Halder, 2020).

To alleviate work pressure and increase work performance among construction labourers, the tasks must be allocated methodically, with a proper working time. Further, as mentioned by Rasool et al. (2019), adequate relaxation periods must be planned both during and after working hours and those working hours should be flexible so that employees can choose from a variety of schedules and the workload can be allocated among all employees (Rouhanizadeh & Kermanshachi, 2019). According to Kharmale and Biswas (2015), these working hours should be estimated through direct coordination with a Planning Engineer, Project Manager, or related Contractors or Sub-Contractors who are knowledgeable about the actual conditions of a project, its resources, and the constituent activities that need to be carried out. Additionally, these should be arranged according to the skill and knowledge level of the employees to increase their job satisfaction (Park & Ko, 2022). Thus, it is important to regularly "shift" their schedules from the day to the evening or night is generally called "shift work" (Beers, 2010).

Shiftwork is now a major feature of the job world across a broad range of industries (Smith et al., 2014). As per Wickramasinghe and De Silva (2011), there are three different shifts such as day shift, evening shift, and night shift.

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Furthermore, Lin et al. (2015) suggested that shift work can be categorised into three main groups day shifts, non-night shifts, and rotating shifts. Moreover, as per Lin et al. (2015), the rotating shift can be further classified as the day shift, which is from 8 a.m. to 4 p.m., the evening shift, which starts at 4 p.m. to 12 midnight or from 2 p.m. to 10 p.m. and night shift from 12 midnight to 8 a.m. in some kind of a rotating pattern. In addition, Lin et al. (2015), further highlighted having 2 days off in 7 consecutive workdays will reduce work stress and increase performance. Hence, it is evident that shift work schedules may differ markedly in terms of organisation and other job-specific activities (Wickramasinghe & De Silva, 2011; Smith et al., 2014).

Therefore, the arrangement of working time is a key issue in an organisation as it is the basic condition linking human capacities with production means (Costa, 2010). These arrangements support the employees in balancing their work and personal lives and ultimately enhance work performance (Richardson & McKenna, 2014). However, only a few studies have examined these work arrangements and their impact in terms of mental health and work performance (Kotera et al., 2020). Hence, it can be identified that, as a main to address that gap the need for such study is essential. Therefore, the study focused on addressing suitable shift patterns for improving work performance in the construction industry.

First, a comprehensive literature review on work performance, shift patterns and the industry's need to investigate suitable shift patterns to improve work performance is presented. Subsequently, the methodology utilised in this study is presented. Following this, the research findings and their corresponding discussion are outlined, culminating in the presentation of conclusions.

## 2. Literature Review

In the ever-evolving world of construction, the performance of the workers plays a pivotal role in determining project success (Hussain et al., 2020). By its very nature, the construction sector places a high value on human capital. Therefore, the health of its workforce directly affects the efficient and timely performance of any construction activity. Hence, optimizing work performance is an important topic. However, in the current world, work shift patterns also play a key role (Chaparro & Ying, 2020) in this context as one of the options available to deal with excessive workload.

### 2.1 LABOUR WORK PERFORMANCE

In developing nations such as Sri Lanka, the construction industry plays a pivotal role in driving economic growth and stands as a cornerstone of the national economy (Manoharan et al., 2022; Silva et al., 2018). In contrast to all other industries, construction is highly recognized for its broad nature, which spans around three economic sectors, where the process starts in the primary sector, moves into the secondary sector, which is concerned with the production of building materials and components, and ends when these materials are transformed into completed structures or finished products (Pheng & Hou, 2019).

Being the backbone of the construction industry, labour involves a variety of skills, each contributing to the extent of their expertise to bring architectural plans into reality (Hussain et al., 2020). As mentioned by Bahmani and Kumar (2023), construction projects primarily rely on manual labour, which occupies central roles in the execution of primary project plans and activities and wields a considerable influence over the overall projects starting from the inception stage to the demolition stage (Hussain et al., 2020).

As one of the largest and most demanding sectors on a global scale, which relies on human decision-making (Assefa et al., 2016) strategic management of human resources has become more pronounced in the construction industry (Jarkas, 2015). Hence, Bahamnia and Kumar (2023), suggest that maximising the utilisation of human resources can have a significant impact on project performance, which consequently, stands as a pivotal determinant of project performance (Hussain et al., 2020).

As defined by the International Journal of Project Management, labour work performance is the ratio of work hours to units of work accomplished. However, as per Yi and Chan (2014), hourly output serves as a more dependable metric for assessing work performance in construction operations, although challenges arise due to variations in units of measurement across different construction tasks.

As per many researchers, considering overall project expenses, labour costs constitute a substantial portion typically ranging from 30% to 50% of the total project cost (Bahamnia & Kumar, 2023; Florez & Cortissoz, 2016; Jarkas & Bitar, 2012) which suggests that the construction industry encompasses a wide range of labour-intensive and risk-sensitive activities. Xing et al.(2020) stated that these tasks should be performed under pre-defined rules and standards, and these standards are crucial for ensuring worker safety, health, construction quality, and cost. Hence, the imperative to safeguard the performance of construction workers is underscored by the substantial economic repercussions associated with poor health and safety, affecting individuals, companies, and nations alike (Zaccheus et al., 2022).

### 2.2 SHIFT PATTERNS IN THE CONSTRUCTION INDUSTRY

A shift pattern is a work arrangement method, in which employees take turns in a predetermined pattern while working at

the same organisation (Wynendaele, 2021). These patterns can be continuous or discontinuous, requiring employees to work at various times over a specified number of days or weeks (Health, Safety and Wellbeing Partnership Group, 2020). Hence, work is divided into shifts for a variety of economic, technological, and societal purposes, and it is a significant human resource management practice which is used worldwide (Gifkins et al., 2017).

In terms of the construction industry, shift patterns play a crucial role in ensuring workforce adaptability and well-being (Groen et al., 2018). These patterns, as suggested by Nea et al. (2018), encompass various employment arrangements such as flexible working hours, compressed working weeks, and remote work which enhance the versatility of the workforce. Hence, shift work requires employees to perform their duties at various times over a designated period of days or weeks (Nea et al., 2018).

By allowing for various time arrangements outside the traditional 9-to-5 work schedule (Bhadke et al., 2022) shift patterns become a vital aspect of any organisation. As pointed out by Cheng et al. (2018), in the construction sector, where projects often demand continuous work, shift work strategies can effectively double the total number of work hours per day.

These measures collectively represent proactive steps taken to enhance workplace conditions and boost employee well-being and work performance as mentioned in Table 1.

Table 1, Available shift patterns

Shift Pattern	Definition	Reference
Single shift	A traditional work schedule where employees work a standard 8-hour shift during the day.	(Townsend et al., 2012)
Double shift	A work schedule which involves dividing the workday into two shifts, with diverse groups of workers working in the morning and afternoon or afternoon and evening.	(Jun & El-Rayes, 2010) (Sweileh, 2022)
Three-shift	A schedule where employees rotate between three different shifts, often including a mix of day, evening, and night shift.	(Araya, 2021) (Sweileh, 2022)
24-Hour shift	A work schedule which goes over for 24 hours.	(Hanna et al., 2008)
Flexible shift	A work schedule which allows workers to have more control over their working hours.	(Townsend et al., 2012)
Weekend shift	A work schedule which involves working on Saturdays and Sundays, either as part of a regular schedule or on a rotating basis.	(Merkus et al., 2015)
Staggered shift	A work schedule, in which employees work 8 hours per day for five days per week, but not all team members work from Monday to Friday.	(Guldenberg, 2004)
Night shift	A work schedule that lasts more than three hours between 23:00 and 06:00 and can be scheduled in a variety of ways, such as two or three shifts, on an irregular schedule, or as a permanent position.	(Garde et al., 2020)

### 2.3 INDUSTRY NEED TO INVESTIGATE SUITABLE SHIFT PATTERNS TO IMPROVE LABOUR WORK PERFORMANCE

As mentioned by Arragoda and Alarcon (2014), long working hours create physical fatigue which will cause mental fatigue, which will finally affect labour work performance. Shift patterns are a good option to minimize this effect, and it can have several positive implications in terms of work performance. As per Hanna et al. (2008), it increased the work performance of labour by allowing construction projects to operate around the clock and shortening project timelines. Then, it optimises resource management (Shehata & El-Gohary, 2011), as the shift patterns can yield substantial savings and costs by optimizing the resources. Thirdly, shift work can be identified as the most common method that is used to increase the labour force in a construction site (Hanna et al., 2008) because by having workers on different shifts project managers can increase the number of workers. Additionally, Chaparro and Ying (2020) highlight that shift work also impacts commute patterns which also can have an impact on labour work performance as the labourers who have to travel long distances to get to the construction site may experience fatigue and reduced work performance. Thus, it is essential to investigate suitable shift patterns to improve the work performance of labourers to address all identified issues.

### 3. Methodology

The choice of the correct method depends on the requirements of the investigation, which is fundamental to the success of the study (Creswell, 2014). Therefore, research approaches can be categorised into three major approaches which are quantitative, qualitative, and mixed approach (Conrad & Serlin, 2011). In this study, as it aims to investigate suitable shift patterns to improve the work performance of labourers, project managers' opinions have been considered to assess the

work performance and the impact of shift patterns on uplifting labour work performance along with the benefits and issues. To take an in-depth understating of this state of the art in practice and the interrelation between work performance and shift patterns both the ideas of project managers and labourers were investigated. Hence to achieve the aim of the study, qualitative and quantitative data were collected, analysed, and connected and achieve the conclusions and recommendations. The combination of the two approaches, which is the mixed approach allows researchers to gain thorough knowledge of a topic and gives a more complete picture of the research area by considering the merits and demerits of each approach. Therefore, this study was conducted through a mixed-method approach. Further, the convergent mixed method is specifically adopted in the study which used qualitative and quantitative data gathered at the same time, but separately from one another, analysed separately with equal weighting, and eventually, the results are compared together.

Semi-structured interviews were conducted with 15 project managers with more than 10 years of experience and a questionnaire survey was conducted using random sampling including 100 skilled and unskilled labourers parallely. Figure 1 analyses the profile of questionnaire survey participants representing labourers' age, experience, and work trades.

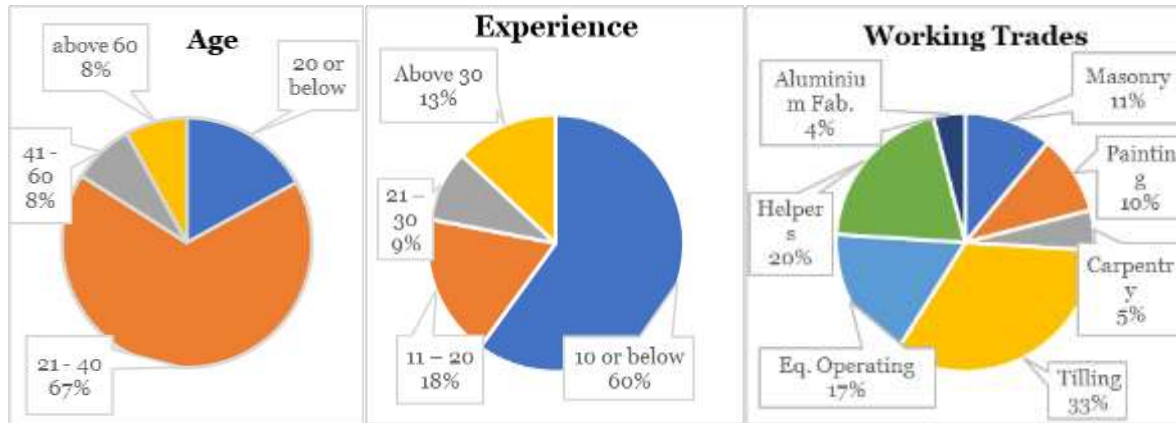


Figure 12:Age, experience and working trades of construction labourers

Table 2 presents the profile of interview respondents, representing the type of organisation and experience.

Table 2: Respondents Profile

Type of Organization	Experience	Respondents
<b>Contracting</b>	10 to 15 years	R11, R12, R13, R15
	16 to 20 years	R5, R6
	20 to 25 years	R10
	Above 25	R1, R2, R3, R4
<b>Consulting</b>	10 to 15 years	R14
	16 to 20 years	R7
	20 to 25 years	R9
	Above 25	R8

In the process of data analysis, manual content analysis was used to analyse qualitative data, and descriptive analysis was used to analyse quantitative data. To identify the impact of shift patterns on work performance, the following rating ranges are used which are classified below in the 5-scale Likert question as mentioned by Genc (2023).

1. Very low level - 1 to 1.79
2. Low level - 1.80 to 2.50
3. Moderate level - 2.51 to 3.39
4. High level - 3.40 to 4.19
5. Very high level - 4.20 to 5.00

#### 4. Research Findings

Interviews and questionnaire surveys mainly aimed to investigate suitable shift patterns that improve work performance, which can be implemented in the Sri Lankan construction industry. Additionally, the impact of shift patterns on work performance, and the benefits and issues of each shift pattern were identified, and those findings are summarized in the following sections.

#### 4.1 OPINION ABOUT WORK PERFORMANCE

Project Managers were asked to give their opinions about work performance. Majority of the respondents simply define work performance as maximising the output per unit of output or it's per person per day per unit of output. Further, the opinions about the work performance explained by the project managers during the interviews are summarized in Table 3.

Table 3: PM's opinion about work performance

<b>PMs' Opinion about the work performance</b>	<b>Respondents</b>
<i>Performance is the ratio between the total output achieved and the total input expended, which is measured on a common basis.</i>	R1
<i>Work performance means the satisfactory delivery of client's projects and it involves achieving the pre-defined goals of the project within the specific time, utilizing resources efficiently, and maintaining the standards in quality.</i>	R2, R7
<i>Quality of resources, workforce morale and their condition, prevailing environment conditions, quality and quantity balancing, and the efficiency of the staff are the main factors which affect work performance.</i>	R5, R6, R8, R13
<i>Both the mental and physical well-being of all types of workers including skilled, semi-skilled, unskilled, and specialized skilled workers significantly impact the work performance of the construction project.</i>	R6

#### 4.2 OPINION ABOUT SHIFT PATTERNS

Eight shift patterns were identified through the literature review and the respondents were asked about the use of those shift patterns in the current context. Accordingly, as mentioned by R1, R3 and R14, the Single shift is the most basic shift pattern, where labourers carry out work within the normal office hours from morning to evening in regular hours. In addition, they further said that in terms of construction, the time of the shift pattern will vary from the standard 8 hours because the nature is different from other industries. As mentioned by R2, both Single shift and Night shift are currently there in the industry although Night shift is not suitable for Sri Lankan labourers. Commenting on the Night shift, R2 stated night work will not give the same productivity as working in the daytime. Additionally, R4 asserted that the Weekend shift is also connected with the Single shift as a part of the regular shift pattern in the construction industry. As a continuously working industry weekend work is essential for the construction industry and this was mentioned by almost all the respondents while participating in the interview. Two respondents mentioned it can be implemented based on work availability while all the others mentioned that it will be a problem with the supply of basic needs and also with the payments because if the Night shift is implemented the allowance is as high as for the first four hours. It is the normal hourly rate x 1.5. Then for the next four hours, it is hourly rate x 2. Moreover, they added that in a country like Sri Lanka people eat a lot at night, hence they cannot properly work at night.

However, from the labourer's point of view, although there were various kinds of shift patterns, the majority of labourers currently worked Single shift and Weekend shift. And also, it was noted there were 15 equipment operators, who have worked under the Night shift in their working life. Further, the labourers emphasized the Weekend shift was included as a part of the regular Single shift and the Night shift was included on a rotated basis, based on the site requirements. However, the time of the Single shift varies from site to site.

#### 4.3 IMPACT OF DIFFERENT SHIFT PATTERNS ON WORK PERFORMANCE

Considering the eight shift patterns identified through literature, both the project managers and labourers were asked to indicate the level of impact of each shift pattern on work performance using a 1 to 5 Likert scale. Table 4 and Table 5 summarise the findings of project managers and labourers respectively.

Table 4: Impact of different shift patterns on work performance as per project manager's perspective

Shift Patterns	Level of Impact					TR	Mean	Level of Impact
	1	2	3	4	5			
Single shift		4	4	7		15	3.20	Moderate
Double shift		4	3	6	2	15	3.40	High
Three-shift		5	4	3	3	15	3.27	Moderate
24 Hour shift	2	2	5	6		15	3.00	Moderate
Flexible shift	4	5	5		1	15	2.27	Low
Weekend shift		4	4	7		15	3.20	Moderate
Staggered shift		2	5	6	2	15	3.53	High
Night shift		8	6	1		15	2.50	Low
<b>1-Very Low, 2- Low, 3-Moderate 4 -High, 5-Very High TR: Total Respondents</b>								

According to the findings, Staggered shift, and Double shift, have a high impact as per the project managers. As they extend the working hours by splitting the day, project managers mentioned that those shift patterns have a higher positive

impact on increasing work performance. Following that Weekend shift, Single shift, 24-hour shift and Three shift have received a moderate impact, which suggests a considerable impact on performance improvement even from currently practised shift patterns. From the identified shift patterns, there is a low impact from the Flexible shift and the Night shift on work performance. Commenting on that, most project managers mentioned that work performance can be considerably low on the Night shift, however, for the production side, this is very much applicable where there is machine-based working because these machines can be continuously operated the entire day with two gangs of people.

Table 5: Impact of different shift patterns on work performance as per labourer’s perspective

Shift Patterns	Level of Impact					TR	Mean	SD	Level of Impact
	1	2	3	4	5				
<b>Single shift</b>	19	29	30	20	2	100	2.57	2.28	Moderate
<b>Double shift</b>	16	58	18	4	4	100	2.22	1.88	Low
<b>Three-shift</b>	14	56	12	18		100	2.34	2.00	Low
<b>24 Hour shift</b>		5	23	7	65	100	4.32	3.91	High
<b>Flexible shift</b>	30	45	4	16	5	100	2.21	2.02	Low
<b>Weekend shift</b>	13	60	8	19		100	2.33	1.99	Low
<b>Staggered shift</b>	22	35	18	20	5	100	2.51	2.28	Moderate
<b>Night shift</b>	20	56	18	6		100	2.10	1.71	Low
<b>1-Very Low, 2- Low, 3-Moderate 4 -High, 5-Very High TR: Total Respondents</b>									

In contrast, as per Table 5, labourers believe that working continuously without taking a rest and without idling will improve their working speed and performance as they ranked 24-hour shift in the 1<sup>st</sup> position. Then it was followed by a Single shift and Staggered shift with means of 2.570 and 2.510 respectively. Considering the Flexible shift, it ranked as 7, with a low mean of 2.210 where the labourers stated that when they have the chance to choose their working time it will not work, because they will not come on time and also without a proper supervisor, they will not carry out the work on time. The last ranked shift pattern is the Night shift having a low mean of 2.10 which is significantly lower than 4.32. Commenting on this, most of the labourers mentioned that after eating dinner they cannot work much as they eat a heavy diet. In addition to that labourer further mentioned that, because of the high workload in the daytime they feel sleepy and tired in the night, which again reduces their working speed in the nighttime.

4.4 BENEFITS AND ISSUES OF IDENTIFIED SHIFT PATTERNS

Project managers and labourers were questioned about the benefits and issues of work shift patterns considering the current context of Sri Lanka and they are demonstrated in Table 6.

Table 6: Benefits and issues of shift patterns

Shift Patterns	Benefits	Issues
<b>Single shift</b>	1. Commonly available shift pattern 2. Align with normal working hours and comply with labour regulations	1. Lack of knowledge of the labourers
<b>Double shift</b>	1. Opportunity to have free time during the daytime. 2. Less Stressful	1. Continuous resource supply.
<b>Three shift</b>	1. Opportunity to have free time during the daytime.	1. Employee Resistance
<b>24-hour shift</b>	1. Continuous Operation	1. There can be frequent machine breakdowns. 2. Legal and regulatory concerns 3. Training and skill requirements
<b>Flexible shift</b>	1. Offer labour autonomy	1. Difficult to find a person to work for the worker taking a break. 2. Have to plan at least a week of the roster.
<b>Weekend shift</b>	1. Increase working time than normal 8 hours.	1. Employee Resistance 2. Cultural Barriers
<b>Staggered shift</b>	1. Optimal resource usage 2. Offer greater flexibility	1. Difficult to find a person to work for the worker taking a break. 3. Have to plan at least a week of the roster.
<b>Night shift</b>	1. Higher pay rates attract the labourers	1. Require additional facilities as transportation, food and accommodation 2. Legal Issues

### 5. Discussion of Findings

Through the process of investigating work performance, the views of labourers and project managers give critical insights into the construction industry. As mentioned by Bashir et al. (2020), the working method is a key characteristic that will decide the performance of any construction labourer. As identified by labourers, working in a 24-hour shift will provide the highest impact on work performance, while Staggered shift and Single shift have a moderate impact on work performance. Although a Flexible shift is a good option as per the literature, in terms of performance labourers have rated that in the last position as it allows more flexibility and therefore labourers will not have control in working.

On the other hand, project managers also recognised Staggered shift and Double shift as beneficial in terms of ensuring resource utilisation and performance management. Further, as the shift patterns, which have moderate impact they have identified Three shift, Weekend shift, Single shift and 24-hour shift. As mentioned by project managers the regular working hours of the Single shift and the rotating work of Staggered shifts also improve performance, as they allow more time to work rather than balance. The above findings are summarised in Table 7.

Table 7, Level of Impact of work shift pattern on work performance

Impact	Project Managers' point of view	Labourers' point of view
<b>High Impact</b>	<b>Staggered shift</b> Double shift	<b>24-hour shift</b>
<b>Moderate Impact</b>	Three-shift Weekend shift <b>Single shift</b> <b>24-hour shift</b>	<b>Staggered shift</b> <b>Single shift</b>
<b>Low Impact</b>	Night shift Flexible shift	Night shift Weekend shift Three-shift Double shift Flexible shift

Additionally, project managers highlighted the challenge of implementing a Single shift pattern, largely due to the diverse behavioural patterns of labourers, who are primarily motivated by financial incentives. It was noted that if labourers are compensated well, they tend to work regardless of inadequate health measures, and consequently, less attention is given to optimizing work shift patterns. Moreover, respondents suggested that a target-based working method might be the most suitable approach for the Sri Lankan construction industry.

Therefore, as a concluding remark, from the identified shift patterns through the literature review, labourers believe a 24-hour shift pattern is the most effective for work performance, while project managers believe Staggered and Double shift patterns have a higher impact on work performance. Hence by considering the high and moderate impact on work performance, from the identified eight shift patterns, Staggered shift, Single shift and 24-hour shift can be identified as the shift patterns which improve work performance from both perspectives of labourers and project managers based on the analysis of research findings.

### 6. Conclusions and Way Forward

This study proposed suitable shift patterns and explored the influence of various work shift patterns to improve work performance from the perspective of project managers and labourers in Sri Lanka. Through an extensive literature review, eight shift patterns were identified. The findings indicate that project managers perceive Staggered shifts and Double shifts as having a high impact on improving work performance. In contrast, Three-shift, Weekend shift, Single shift, and 24-hour shift are seen as having a moderate impact, while Night shift and Flexible shift patterns are considered to have minimal impact. However, labourers believe that 24-hour shift has a high impact on work performance, while Staggered Shift and Single shift has a moderate impact and Night shift, Weekend shift, Three shift, Double shift and Flexible shift have a low impact on work performance. Hence, by considering the high and moderate impact, Staggered shift, Single shift and 24-hour shift were identified as the most recommended shifts which improves work performance.

The study focuses only on building projects and the data collection regarding labourers was limited to skilled, semiskilled and unskilled labourers of building trades including tilers, painters, masons, helpers, carpenters, equipment operators and aluminium fabricators, while the data collection regarding project managers were limited to professionals who are currently working or worked in the construction industry and who have more than 10- year experience.

The findings of this study have significant implications for project managers and policymakers in the construction industry. Understanding the effectiveness of different shift patterns can guide the development of strategies to enhance



labour productivity. Future research should explore the effects of different shift patterns on the health and well-being of labourers, as this study primarily focused on work performance.

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