

## ASSESSMENT OF LABOUR PRODUCTIVITY IN ROAD CONSTRUCTION PROJECTS OF PAKISTAN

Wesam Salah Alaloul<sup>1</sup>, Muhammad Ali Musarat<sup>1\*</sup>, Hussain Mehmood<sup>2</sup> and Muhammad Altaf<sup>1</sup>

<sup>1</sup>Department of Civil and Environmental Engineering, Universiti Teknologi PETRONAS, Bandar Seri Iskandar, 32610 Tronoh, Perak, Malaysia

<sup>2</sup>Department of Civil Engineering, Sarhad University of Science & Information Technology, Peshawar, Pakistan

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\*Corresponding author's email: muhammad\_19000316@utp.edu.my

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**Abstract** — Road construction in Pakistan is booming because of China's One Belt One Road program. Pakistan is in a developing stage and facing a lot of challenges in construction projects, primarily in labour productivity. This research focuses on the factors affecting labour productivity in road construction projects of Pakistan. A questionnaire was developed to observe the impact of critical factors on labour productivity. Based on the gathered responses, the factors were ranked using the Relative Importance Index (RII). The analysis shows that out of thirty (30) factors, the most important five (5) factors that affect labour productivity on road construction are unskilled workforce, payment delays to labour, tools and equipment shortages, poor communication of supervisor with labours and financial difficulties of owner/contractor. By focusing on these critical issues' betterment can be made in labour productivity which will directly enhance the projects' performance.

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**Keywords:** Labour Productivity, Critical factors, Road, Construction Industry, Pakistan

### 1.0 INTRODUCTION

Due to the severity of construction projects, the construction team has to deal with unparalleled circumstances [1-6]. Successful completion of a construction project depends on highly correlated management inputs like capital, materials, and labour-force [7-12]. The construction industry is a labour intensive industry and labours are considered an asset of the company, and, therefore, understanding of labour productivity concept is very important [12, 13]. Labour productivity has a high impact on construction management [14], where the best management practices in construction are to measure and monitor productivity on time [15]. The problems associated with the unsatisfactory project completion are productivity problems, mostly related to labour performance [16, 17].

In the production process, productivity represents a relationship between output and the associated input. Almost, 30-50% of the total project cost is associated with the labours, as it is the most dominant resource of the construction industry [18-21]. For better performance and increased productivity in the construction industry, it requires an understanding of the various factors that affect productivity [22-24]. Many factors affect labour productivity and identification and evaluation of these factors are key issues that are faced by project managers during the execution phase of construction projects [25].

Labour productivity is a vital component in executing a project successfully which results in considerable profit to the construction industry and impact the economy of the country [9]. Labours are considered as an important resource that executes the designs into physical structures, hence, the workforce comprises as one of the most important constrain to labour productivity [26]. The project management policies i.e., communication with labours and motivation in the form of incentives influences labours productivity positively [27]. Moreover, poor work quality results in rework that influences the productivity level [27]. Yahaya, et al. [28] revealed that the tools and equipment are the top factors that affect labour productivity, as tools can boost the labour output in less time. Kadir, et al. [27] observed that due to payment delay to the suppliers, the materials shortage at the project site occurs, which affect the output of the labour to complete a project on time, resulting in time and cost overrun. The unavailability of experienced labours obstructs the organization to exploit its resources to execute a project successfully. Hence, it becomes difficult to adopt modern construction techniques without having skilled labours, thus, labour productivity cannot be improved [29, 30].

Due to the ignorance of the Government, the construction industry in Pakistan did not show good results [31, 32]. Various projects in Pakistan have been postponed or rescheduled because of delays effect [33]. The transportation sector contributes to the economy by 4-5% to GDP each year which shows a huge interest in investment for transportation routes [34]. The national highway in Pakistan is an important route that carries 80% of trade traffic [35]. In Pakistan, a massive deficiency in the planning phase has been observed in road construction projects. The lack of residential facilities, food, health, and safety at the project site hinders labour productivity [31]. A mega project, China-Pakistan Economic Corridor (CPEC) aims to construct a new route of 2500-3000 km which will connect Gawadar port with Kashghar [36, 37]. The militancy attack on the labour at various road construction site affected the performance of the labour, resulting in a negative effect on project completion [38]. Furthermore, some other factors affect labour productivity in road construction projects. Likewise, delayed payment in construction projects always affects the projects adversely. In Pakistan, the road projects are mostly sponsored by the Government and it is a fact that payments are delayed because of lengthy processes in the Government Departments [31].

Labour productivity is the least explored area in the construction industry of Pakistan [39]. The poor quality of labour productivity in Pakistan is because one-third of the workforce is illiterate that make it difficult to learn new skills and master new technologies. According to the latest Labour Force Survey (LFS) report, utilizing skills group classification of the International Labour Organization (ILO), Pakistan labour market is creating opportunities requiring low, medium and high skills with a ratio of 18:71:11 respectively [40]. Consequently, the labour workforce in Pakistan increased to 55.51% in December 2018 [41]. Therefore, this study is focused to highlight the issues of labour productivity in the construction industry of Pakistan. However, the study scope is limited to road construction projects only.

## 2.0 METHODOLOGY

Thirty (30) critical factors were identified from the literature review [26-28, 42-45] which has a direct and indirect effect on the labour productivity on road construction projects in Pakistan. After performing the structured interview and having the expert opinion of stakeholders, these factors were then transformed into a research questionnaire based on the Likert scale from 1 – 5, showing 1 as strongly disagree and 5 as strongly agree. A pilot study was conducted on a small scale among the stakeholders to know the level of the understanding of the questionnaire. A random distribution of 100 questionnaires was made among the clients, consultants, and contractors in Khyber Pakhtunkhwa, Pakistan. Out of 100 questionnaires, 40 were sent through emails, 35 through the post and 25 questionnaires were distributed by visiting different construction sites and offices. Overall, 80 valid responses were collected, and the respondents’ feedback rate is shown in Table 1.

**Table 1** Respondents Feedback Rate

Type of Respondents	No of questionnaire	Respondents percentage %
Consultants	20	25
Contractors	45	56
Clients	15	19
Total	80	100

Two tests techniques were utilized for the data analysis. Within the Statistical Package for Social Sciences (SPSS), Cronbach’s alpha test was performed to check the internal consistency of the responses by the respondents. Once the gathered data found consistent, the Relative Importance Index (RII) was calculated to rank up the factors by using Equation 1:

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

Where, w = weighting given to each factor from 1 to 5, A = highest weight, N = total number of respondents

### 3.0 RESULTS AND DISCUSSION

Cronbach's alpha method was used to check the internal consistency of the data where the value comes as 0.897, as shown in Table 2. If the value of Cronbach's alpha is above 0.90 it shows excellent reliability, 0.70 to 0.90 shows high reliability, 0.5 to 0.7 shows moderate reliability and below 0.5 shows poor reliability. Thus, the results indicate that the data is internally consistent. After the acceptance of Cronbach's alpha result, RII was calculated to find out the ranking of these critical factors. Table 3 shows the RII value and the ranking of critical factors.

**Table 2** Cronbach's Alpha Result

Case Summary Processing					
Case	Valid	N	%	Cronbach's Alpha	0.897
	Excluded <sup>a</sup>	80	80	Number of Items	30

**Table 3** RII Ranking

S. No	Factors	RII	Rank
1	Unskilled Workforce	0.87	1
2	Payment delays to labours	0.85	2
3	Tools and Equipment shortage	0.83	3
4	Poor Communication of supervisor with labours	0.82	4
5	Financial difficulties of contractor/Owner	0.82	5
6	No financial motivation system (Incentives)	0.81	6
7	Rework	0.80	7
8	Poor health of workers	0.78	8
9	Inadequate Lighting during late hours	0.78	9
10	Dangerous working Condition	0.77	10
11	Climate and weather conditions	0.77	11
12	Increased age of Labour	0.76	12
13	Incomplete Drawings	0.75	13
14	No Clear methods of work	0.75	14
15	No Construction Schedule	0.75	15
16	Project Location	0.74	16
17	working 7 days a week	0.74	17
18	Length of working hours	0.73	18
19	High Absenteeism of labours	0.73	19
20	An increasing number of labours to speed up work	0.73	20
21	Overtime	0.73	21
22	Difference of language among labours	0.72	22
23	Labour Strikes	0.72	23
24	Labour personal problems	0.72	24
25	Design changes	0.71	25
26	Absence of personal protective equipment	0.69	26

27	Security of the project site	0.69	27
28	Relationships among labours	0.68	28
29	Ability of labours to adapt to a new environment	0.64	29
30	Poor Soil Condition	0.60	30

The results show that the top ten factors which affect road construction projects in Pakistan are: (1) Unskilled workforce, (2) payment delays to labour, (3) tools and equipment shortages, (4) poor communication of supervisor with labours, (5) financial difficulties of owner/contractor, (6) no financial motivation system, (7) rework, (8) poor health of workers, (9) inadequate lighting during late hours and (10) dangerous working conditions. The discussion of the top ten factors is provided below:

### 3.1. Unskilled workforce

In the construction industry, skilled labour plays an important role in completing a project successfully. The project's progress is influenced to a lesser or greater extent by the skills of labours. Whereas unskilled labour turns out to be one of the biggest challenges for the construction industry as they do not meet the skills required to complete a task successfully with the quality and on time, hence, influencing the progress of the project adversely. The companies should hire skilled and qualified staff and arrange workshops and training to enhance their skills and productivity level.

### 3.2. Payment delays to labour

The factor which affects labour performance and interest is timely payments of labour wages. The lack of timely payment causes mental issues to the labours which affect their production capacity. Currently, in the construction industry, the delayed payment becomes one of the most important issues that hinder the successful execution of a project. The attitude of delayed payment should be compensated as it will promote labour productivity and the practice of timely payment to the labour will lead the project towards success.

### 3.3. Tools and equipment shortages

Innovative tools and equipment in the construction industry convert labour efforts into useful and productive output. Performing a task with the help of tools and equipment may enhance the output for a similar number of labours hours. Whereas in construction, sometimes a project execution phase faces the shortage of advanced tools and equipment that reduce labour productivity. Hence, to improve labour productivity, companies need to make sure the availability of different types of tools and equipment.

### 3.4. Poor communication of supervisor with labours

In construction projects, the supervisor needs to communicate with the labours about the tasks and production timing to keep everyone on the same platform while performing an activity. Lack of communication always leads to mistakes and errors which causes delays and wastage of time and money that affects labour productivity. Fair communication is needed between the supervisor and labours to minimize mistakes and errors.

### 3.5. Financial difficulties of owner/contractor

Owner's or contractor's financial related issues are one of the critical factors that affect labour productivity. Delay of payments by the owners or contractor to the sub-contractor and suppliers endangered to financial obstacles, results in slow progress on site. Moreover, delayed payments to the suppliers can affect the delivery of materials on site which reduces labour productivity. To execute a project on time and to utilize labour performance, the financial issue must be overlooked from the start of the project.

### 3.6. No financial motivation system

Financial motivation systems are used to increase the motivation and labour performance on-site by rewarding them financially or any other kind of reward. These motivation systems are meant to boost the labour output and

their confidence that they can accomplish their target on time. Whenever such types of motivational strategies are ignored, the labour believes that they are not getting paid for their efforts and hard work, so they lose interest in their job and do not participate in extra work, hence, labour productivity decreases.

### 3.7. Rework

Rework is a critical factor that seriously impacts labour productivity and project performance. Lack of skills and experience, as well as labours missteps, leads to rework and losses of productivity. Moreover, poor coordination among the construction stakeholder sometimes affects the project flow, resulting in change order which leads to rework and reduces labour productivity. To avoid rework, training should be conducted for the labours to learn skills and techniques to prevent errors minimizing the chances of rework, which will increase labour productivity.

### 3.8. Poor health of workers

The health of labour is an important criterion for productivity and successful project execution. Healthy labour can spend more time in the workplace. The risk of labour expose to heat, noise, chemicals, unsafe machines can cause serious health issues that reduce their ability to work properly. Therefore, the labours need health care services in the workplace for the early cure of injuries and identification of diseases.

### 3.9. Inadequate lighting during late hours

Poor lighting during late hours can cause eyestrains, fatigues, stress and most importantly accidents which leads to reduce labour productivity. Good lighting in late hours at the workplace improves labour productivity as well as minimize the chances of errors. It highlights the activities and movements of machinery and other safety hazards.

### 3.10. Dangerous working conditions

Working of labours in dangerous condition is the major cause of injuries in construction projects. The unsafe condition poses a threat to labours which negatively affect the productivity and causes injuries on site. Labours are supposed to work in protected condition and to be supplied with proper safety measure to ensure safety and increases productivity.

## 4.0 CONCLUSION

The purpose of this study was to highlight the factors that affect the labour productivity in road construction projects of Pakistan and redirect the attention of the Government to focus on labour productivity. Findings reveal that companies should hire experienced staff and training should be conducted by companies to enhance the skills of the workers to avoid the stress of rework. The Government should focus on technical education and a proper payment system should be applied. For tools and equipment shortages the company should have an emergency policy for the shortage and repair system of the equipment. For better performance, the company should applicate a two-way communication system. An incentive system should be applied to labours which will encourage labours interest and increase productivity. Companies should make a diet policy for the proper intake of calories per day and provide proper health care services on-site for the good health of labours. During late hours, a proper lighting system should be acquired that will highlight the movements and other safety hazards. Moreover, proper safety measures and equipment should be provided to the labours to ensure safety and increases productivity. It is therefore recommended to observe these critical factors being executing construction projects, which will minimize labour productivity issues and bring success to construction projects.

### **Conflict of Interests**

The authors declare that there is no conflict of interests regarding the publication of this paper.

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