IMPACT OF REGULATIONS ON CONSTRUCTION LABOUR PRODUCTIVITY

M.A.Y. Sujani, R.A. Rahman, N. Mohd Zainudin

Abstract

Labour productivity in the construction industry has significantly declined. Therefore, there is a need to assess construction labour productivity in the present day. Regulation is known as one of the factors that may directly affect productivity. This study aims to find the impact of different regulations on construction labour productivity. Data were collected through individual interview sessions with twelve (12) construction industry practitioners from contractor, consultant and client stakeholders to achieve that objective. Then, the collected data were analysed using the thematic analysis technique. The results show that regulations can positively and negatively impact construction labour productivity from four aspects: time, cost, processes and human resources. Furthermore, several types of challenges can emerge due to regulations: time constraints, bureaucracy, management, human resources demand, professionalism and etiquette. This study contributes to the construction body of knowledge by exploring the impact of regulations on construction labour productivity. Industry practitioners and policymakers can use this study as a reference to maximise construction labour productivity.

Keywords Sustainable development, Construction Industry, Construction productivity, Regulations, Human.

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Introduction

While construction industries are contributing to national and international economics, the sector's productivity has been declining. Productivity is generally the ratio of output to input. Specifically, construction productivity is widely measured in unit rate, which is the number of actual work hours required to perform the appropriate work units. However, units of measurement change with the construction activity, depending upon the types of input and output. Nevertheless, the importance of productivity in reducing cost and generating profit is central across all industries, including the construction industry (Hasan et al., 2018). In other words, construction labour productivity is one of the keys to succeed on the construction project, as the labour plays a major role in completing the construction project.

Labour in the construction industry could be defined as all workforces involved in the process that had to be carried out to accomplish and achieve the goal. The labour productivity insufficiency will affect the performance of the overall project (Karim et al., 2013). Labour productivity is one of the most important factors that affect the physical progress of any construction project. Construction labourers are responsible for operating a variety of equipment. To perform their jobs effectively, construction labourers must be familiar with the duties of other craft workers, with the materials, tools and machinery they use.

While productivity is an important aspect for the survival and growth of construction organisations, regulations related to the construction industry are always berated for its low or even negative rate in productivity increase (Durdyev et al., 2012; Crawford & Vogl, 2016). The introduction of different regulations on the construction project varies depending on the necessity. Prior works also suggest that productivity growth has been negative in construction, mostly in developed countries like the United States of America (Teicholz, 2013). Other works have suggested that regulating undocumented immigrants can reduce productivity by 0.1 % a year (Sveikauskas et al., 2016).

This study identifies the impact of regulation on labour productivity in the construction industry. This study collects open-ended individual interview data with industry practitioners and analyses the collected data using the thematic analysis technique to achieve that objective. The interviews involve industry practitioners that are directly involved in managing construction projects. Thus, this study contributes to the construction body of knowledge by illustrating the impact of different regulations on construction labour productivity. Furthermore, this study can serve as a review point to the construction industry on existing regulations to maximise construction labour productivity in the future.

Literature review

Definition of Regulation

Economists and lawyers define regulation in different ways. Traditionally, the legal definition refers narrowly to a subset of delegated regulatory instruments (MPC, 2013). In contrast, economists have adopted a broad generic definition that embodies all written legal and quasi-legal instruments ranging over primary legislation, secondary instruments, guidelines, circulars, codes and standards (MPC, 2013). Moreover, the content of written regulations, and the way they are implemented, administered and enforced can also significantly impact compliance burdens for businesses and the effectiveness of regulations (MPC, 2013).

Definition of Productivity

The choice of the measure or measures of resource input gives rise to three popular variants of productivity (Stats 2016): labour productivity (defined as the amount of output per paid labour hour), capital productivity (defined as the amount of output per value of assets used in the production process; the asset may be buildings, machinery, computers and land); multifactor productivity (defined as the growth in output that cannot be attributed to labour or capital input). However, a more industry-

relevant definition that is widely accepted among construction industry stakeholders' expresses productivity in the context of performance measurement, i.e. measuring how well resources are leveraged to achieve set targets or desired outputs (Durdyev & Mbachu, 2011). This definition is adopted in this study as it is consistent with the study objectives.

Construction Labour Productivity

Sveikauskas et al. (2016) showed that labour productivity growth has been positive and substantial in all four industries where reliable deflators exist. Shifts of labour between construction industries reduce productivity growth by 0.4% a year. Regulation has a significant negative impact on productivity but reduces productivity growth by only 0.1% a year. Undocumented immigrants are important in construction and often work off the books. However, a reasonable allowance for their increased presence reduces productivity growth by only 0.1% a year.

Insufficient labour skills and inexperienced workers will result in the loss of productivity time and cost. New construction workers require training sessions to learn and improve their performance and knowledge in construction work (Porntepkasemsant & Charoenpornpattana, 2015). According to Jarkas et al. (2012), the delays in responding to Requests for Information (RFI) impact the construction labour productivity in terms of regulation. This happened as implementing this regulation takes time, as many documentations should be prepared first.

Based on the related literature, several studies have investigated constraints to labour productivity (Ng et al. 2004; Grimes 2007; Jarkas & Bitar 2012). Previous studies often suggested that productivity growth has been negative in construction in the United States (Teicholz, 2013; Sveikauskas et al., 2014) and internationally (Abdel-Wahab and Vogel, 2011). Various reasons have been invoked to explain negative productivity trends, such as industry shifts within construction, increases in land-use regulation and the use of questionable

deflators (Ganong & Shoag, 2012).

Methodology

Data Collection

The method that has been used is by doing an individual interview for data collection. This method has been used to identify the emerging variables in other construction management areas, including assessment criteria for construction readiness (Radzi et al. 2020) and success factors (Rahman et al. 2020) of highway construction projects. The open-ended questions are: (1) How does regulation impact labour productivity in your construction projects? And (2) What are the challenges you faced in your construction projects caused by regulation enforcement? The interview sessions take about 30 minutes up to 60 minutes. The interview starts with the introduction of the topic. Then, the study objectives were explained to make sure they knew the purpose of the interview session. The explanation also plays a major role in ensuring the respondent understands and answers according to the open-ended questions. In addition, printed questions have been prepared to ensure that the respondents have a deep understanding and have more ideas. Therefore, all important information would less likely be missed. Next, follow-up questions are also given to get more specific details and prevent misunderstanding of the responses data. After that, all informations were summarised and emailed to the respondents for any feedback.

The requirement for the targeted population is the individuals must be involved directly with the construction project field. The target population includes several parties, contractors, consultants and clients (i.e. developers and government agencies). This group of stakeholders is chosen because these individuals are professional, highly knowledgeable and skilful in the construction field. The individual interviews were performed with the targeted population and focused on the construction project's professional and management. This study's respondents consist of only 12 individuals, which is enough as the data collection shows the same

answer pattern and that the data is highly saturated.

Data Analysis

The thematic analysis has been used to analyse data that had been collected from the individual interview sessions. The thematic analysis has been selected to analyse the data because it is a common form of analysis in qualitative research (Guest et al., 2011). Other construction management studies that implemented this approach to analyse qualitative data include defining attributes of change agents for successful construction technology adoption (Radzi et al. 2019) and strategies for addressing the pandemic impact on the construction industry (Zamani et al. 2021; King et al., 2021).

This method consists of several stages: coding, development of subthemes and creation of themes (Nowell et al., 2017). Coding is the early stage of the thematic analysis. The data that have been summarised then must be analysed to justify some words that are relevant to the research topic. The words that have been chosen as the code must not be changed from the original or be interpreted. From one sentence, few codes can be generated as the sentences can be related to each other. The code formation has no limitation as long as it is relevant for the research topic. The codes that have been chosen from the codes that have the same pattern have been gathered and put together. From the gathered codes, the interpretation of the codes has been made to develop subthemes. The subthemes have been aligned with the code's contents and the purpose of the research topic. Then, the subthemes can be accepted due to their relevant content. Theme creation is the last stage of thematic analysis, where the forming subthemes have been assessed to create new themes. The creation of themes is very important as it comes from the combination of subthemes, where themes will justify the true meaning of subthemes and emphasis on it by using some words that contain value or concept. The value and concept of the themes must also be aligned and relevant to the research topic.

Result and Discussion

Impact of Regulation on Construction Labour Productivity

Table 1 overviews the impact of regulations on construction labour. In contrast, Table 2 details the impact. The result shows that most of the accreditation and training give a positive impact on construction labour productivity. Likewise, the usage of thumbprint compared to punch cards shows the same result. Other than that, the toolbox, prestart meeting and induction session have positively impacted construction labour productivity. Contrary to that, most of the negative impact comes from the procedure to renew the permit to work (PTW) of foreign labour, which directly impacts the time, cost, process and human resources. Other than that, the safety measures have been negative, as the strict rule of safety has been applied and no budget is allocated for it.

Most of the respondents affirm the processes that positively impact construction labour productivity. This is related to the accreditation given by the Construction Industry Development Board (CIDB) and the usage of Standard Operating Procedure (SOP) at the construction site, which lead to the smoothness of the project. The accreditation also affects time as the skilled worker will positively impact construction labour productivity. The most common accreditation that is mandatory is Green Card by CIDB.

Table 1: Overview of impact of regulations on construction labour productivity

Respondent	1	2	3	4	5	6	7	8	9	10	11	12	Total
Positive impact													
Time	✓	✓	✓		✓				✓	✓	✓	✓	8
Cost	✓			✓	✓		✓						3
Process	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	12
Human resources	✓	✓											2
Negative impact													
Time	✓	✓			✓	✓	✓	✓	✓				7
Cost	✓										✓		2
Process	✓				✓		✓	✓	✓		✓		6
Human resources	✓			✓							✓		3

Table 2: Impact of regulations on construction labour productivity

Positives	Negatives
Time	
The PTW can be extended up to two years	Some foreign labour needs to return to their country due to the expiration of PTW
The construction work and documentation can be done accordingly and on time as SOP	Much time is needed to renew the PTW due to the immigration department procedures
The annual leave application by using the systematic system	The regulation enforcement raid will cause a loss of time as the labour will be quarantined and released if they meet the condition to work

The presence of regulation will smooth the construction works as scheduled	The process to apply for Lifting Machineries Certificate (PMA) is taking time for approval
The induction session, prestart and toolbox meeting reduced the time for safety and work progress	The toolbox is not worth for small company in term of time
	More time is required to work at a narrow site if PPE is applied
Cost	
Some foreign labour agreed if their salaries need to be cut	Most of the Indonesian labour refused for their salaries to be cut
The accreditation for skilled labour benefits company investment	The budget for PPE was not included in the budget
The usage of machinery and tools that have insurance	The levy for extended PTW would be expensive
The insurance that is included as CIDB Green Card initiative	Additional cost for the company to send labour to take courses
The usage of new machinery and tools	
Process	
The accreditation is given by CIDB	The new policy will affect the work process
The quality of high-standard work has been achieved	The strict rule of using PPE will slow the work process
The usage of thumbprint systems is efficient	

The introduction of Fatigue Management The usage of SOP as one of the regulations The selection of labour must meet the requirement Training has been done	

Human resources	
Accreditation for skilled labour	The presence of part-time labour
The person who takes leave will have a substitute as the person in charge of taking their role during their absentees	Labour needs to take leave for the PTW renewal process
	Incompetence companies will be facing a shortage of skilled labour

Also, the negative impact of the regulation on construction labour productivity by respondents. The result shows that most respondents narrate on the time issue, which negatively impacts construction labour productivity. One of the respondents from a contractor company said that Personal Protective Equipment (PPE) has slowed down the work, mostly when the work was done in a narrow place. The usage of PPE actually has been claimed as slowing their work, as it restricts the worker's movement. Even though such a claim has been made, most respondents still comply with PPE usage at the construction site because they think safety and life are more important than anything else.

Challenges caused by regulations

Table 3 overviews the challenges caused by regulations in the construction industry. In contrast, Table 4 details the challenges of regulation enforcement on construction projects mostly related

to the professionalism and etiquette where the senior and experienced labour failed to follow the regulation. The bureaucracy also profoundly challenges regulation enforcement on a construction project, where a lot of time and cost are needed to fulfil the requirement of a PTW. Several respondents suggested that time constraints about applying some new construction regulations affect the labour working hour. Other than that, professionalism and etiquette also need to be highlighted because more relevant content has been found. The attitude of the senior worker that refuses to comply with some regulation needs serious attention.

Table 3: Overview of challenges caused by regulations in the construction industry

Challenges	Respondent												
	1	2	3	4	5	6	7	8	9	10	11	12	Total
Time constraints	✓		✓			✓	✓	✓		✓		✓	7
Bureaucracy	✓		✓						✓	✓		✓	5
Management	✓	✓			✓	✓	✓						5
Human resources demand	✓	✓		✓						✓	✓	✓	6
Professionalism and etiquette			✓		✓	✓	✓						4

Conclusion

The data shows that regulations positively and negatively impact construction labour productivity regarding time, cost, process and human resources. The result shows that several respondents agree that regulation gives a positive impact on construction labour productivity. Furthermore, challenges that have been caused by enforcement of the regulation are time constraints, bureaucracy, management, human resources demand, professionalism and etiquette. The procedure to renew the PTW is most likely the negative impact of regulation. The positive impact towards process on regulation is described as good management, and most of the challenges come from professionalism and etiquette.

Therefore, the construction project management needs to educate and train workers about professionalism and etiquette to create good management. In conclusion, the present regulation on a construction project positively and negatively impacts construction labour productivity in terms of time, cost, process and human resources. On the other hand, the challenges that have been caused by enforcement of the regulation are time constraints, bureaucracy, management, human resources demand, professionalism and etiquette.

Table 4: Challenges caused by regulations on the construction industry

Types of challenges	Challenges
Time constraints	1. The application of some new regulations on the construction will take time and affect the labour working hour.
Bureaucracy	1. The process to renew the PTW is taking much time and costly. 2. In case of emergency, most illegal workers will face trouble as they did not have proper documentation. 3. Foreign workers' agencies mostly possess foreign labour passports; therefore, foreign labour would take time if any raid happened on the construction site. 4. A penalty will be given as safety regulations are not followed.
Management	1. The unsystematic data documentation. 2. To regulate high safety measured without a budget. 3. To meet the standard that may be beyond human control.
Human resources demand	1. Shortage of skilled labour that has specific certificate.

Types of challenges	Challenges
	2. Lose track of pressured multitasked labour. 3. Demand for a higher salary.
Professionalism and etiquette	1. Foreign labour needs more attention as they are facing communication difficulties. 2. The bad attitude of experienced labour toward safety regulation, for example, failed to wear PPE. 3. Most of the senior labour failed to renew their CIDB Green Card. 4. The illegal foreign labour does not go to a special course such as Green Card Training 5. Most foreign labour does not know about new regulations.

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