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PAYMENT METHODS AND PRODUCTIVITY OF CONSTRUCTION SITE WORKERS: A REVIEW

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Abstract

Construction Labour Productivity (CLP) is important to the construction industry as it has a direct impact on the competitiveness. Labor productivity is gaining growing attention as the construction industry faces many challenges related to workforce, but one of the most important is poor labor productivity. Several construction projects were suffering from various problems, including poor management, declining fertility, and thus causing projects delay, and cost overruns. The main aim of this study, therefore, is to review previous studies on labour productivity and factors affecting it in the construction industry in Nigeria. Hence, to emphasize on the need to look at payment methods as a sensitive factor affecting labour productivity in construction industry. The common payment methods used in Nigeria construction sites were briefly discussed. The finding of the study will help in understanding the directions required for better management of CLP in terms of payment techniques in Nigeria construction sites.

Keywords: Construction Site, Labour, Payment Methods, Productivity, Workers

Introduction

Construction efficiency is crucial for the country's economic growth and plays a significant role in the construction industry (Naoum, 2016). The construction industry is a key employer and contributes greatly to the success of the broader economy (Giang and Pheng, 2011). Labour is the most significant and versatile resource in the building sector. A good number of people are employed in construction projects. Construction projects employ a large number of people, so manpower is the most valuable productive resource. As a result, construction productivity is highly reliant on human activity, reliability, and results (Jarkas, 2010). Different researchers have provided various meanings of productivity.

The technique of maximizing output while limiting input is referred to as "productivity" (Naoum 2016). It is now defined as the ratio of an output value to the input value used to make the output (Alaghbariet al. 2019). Materials, labour, capital, and energy are used to create the product, while materials, labor, capital, and energy are used to create the input (Drewin 1982). Construction Labor

Productivity (CLP) is the number of units of work placed or generated per man-hour in the construction business (Bekr 2017). As a result, it can be calculated in terms of working hours (Thomas et al. 1990). The ability to make anything according to Yi and Chan (2014), is defined as "the ability to be efficient as well as efficiency and the rate at which goods are created." According to Griego and Leite (2017), productivity is defined as the amount of work accomplished by an employee.

Low productivity is one of the most important challenges in the construction sector (Jarkas and Bitar 2012). In many nations around the world, low productivity in the construction industry is a serious issue (Ayele and Fayek 2019). Low productivity is harmful to the economy because it causes inflationary pressures, social tensions, and mutual suspicion (Shoar and Banaitis 2019). Recognizing the importance of the elements that lead to low CLP, project managers may be able to resolve issues sooner rather than later, resulting in fewer schedule and expense overruns (Seddeeqet al. 2019). The CLP has a significant impact on construction company profitability, but it also has the largest unpredictability among project resources, making it a significant source of project risk (Tsehayae 2015).

Who are construction workers?

Construction workers work on construction sites. They are responsible for a number of on-site tasks, such as removing debris, erecting scaffolding, loading and unloading building materials, and assisting with operating heavy equipment. A construction worker is a worker employed in manual labour of the physical construction of the built environment and its infrastructure (Makulsawatudom and Margaret, 2003).

The term construction worker is a broad, generic one and most such workers are primarily described by the specific level and type of work they perform. For example, labourers carry out a wide range of practical tasks to help tradespersons on construction sites (Vekaria, 2012). They clean the construction site on a regular basis using tools such as rakes, shovels, and wheelbarrows to remove rubble, scraps of metal, and wood. They might also need to sweep out certain areas and put building supplies in order (GhatePrachi *et al.*, 2016).

Construction worker responsibilities include: Preparing construction sites, materials, and tools. Loading and unloading of materials, tools, and equipment; Removing debris, garbage, and dangerous materials from sites; Assembling and breaking down barricades, temporary structures, and scaffolding; Assisting contractors, e.g. electricians and painters, as required; Assisting with transport and operation of heavy machinery and equipment; Regulating traffic and erecting traffic signs; Following all health and safety regulations; Digging holes, tunnels, and shafts; Mixing, pouring, and leveling concrete (Thiyagu and Dheenadhayalan, 2015).

Labour Productivity

Productivity is commonly defined as a ratio between the output volume and the volume of inputs. In other words, it measures how efficiently production inputs, such as labour and capital, are being used in an economy to produce a given level of output (Dixit *et al.*, 2019). Productivity is considered a key source of economic growth and competitiveness and, as such, is basic statistical information for many international comparisons and country performance assessments (Hong *et al.*, 2012).

Productivity is one of the most significant concerns in Nigeria. It remains an interesting focus and a prevailing subject in the construction sector, encouraging cost savings and effective usage of resources. It is a link between outputs and inputs. It increases when a rise in output happens with a less than proportional rise in inputs, or when the same output is produced with fewer inputs (Hiyassat *et al.*, 2016.). Inputs include labour and capital, while output is usually measured in revenues and other GDP components such as business inventories. It measures may be examined collectively through the entire economy or seen industry by industry to study tendencies in labour progress, wage stages and technological development (Odesola and Idoro, 2014.). Productivity can be determined in terms of every factors of production combined or in terms of output per unit of labour input, calculated in terms of the number of people working or the number of periods worked (Shoar and Banaitis, 2019.). Productivity in respect to labour measure the economic growth of a nation. It also measures the volume of goods and services offered per an hour of labour. More precisely, it measures the value of actual gross domestic product made per hour of labour by depending on factors which include investment and saving in physical capital, new technology and human capital (Rami, 2014).

Labour productivity performs a very vital role in building construction industry. It is believed that, this industry must increase its effectiveness and productivity significantly to remain viable. This implies that the industry is essentially to look for the various issues militating against labour productivity in construction industry and the crucial means of improvising it to make it more resourceful and productive (Hickson and Ellis, 2014.). Achievements which include higher remunerations for workers, healthier working conditions, better benefits and short working hours; these can result to increase in workers' job satisfaction and motivation (Dai and Goodrum, 2011).

Factors Affecting Labour Productivity according from Previous Studies

Researchers in the field of construction management have been paying close attention to the factors that influence productivity. A variety of studies have been conducted on this subject from various perspectives.

Duration: There are numerous activities that cause productivity loss during construction projects. Going overtime has been shown to reduce productivity in previous studies. Fatigue, increased absenteeism, decreased morale, reduced supervision effectiveness, poor workmanship, resulting in higher rework, and increased injuries are the most commonly cited causes (Kazaz *et al.*, 2008). Working overtime increases output at first, but it can lead to higher costs and lower efficiency if you keep doing it (Shah Meet *et al.*, 2014).

Tightening of Schedule: The early delays in a project compresses the total time for an operation to compensates for the delays and complete the assigned task on time. From the standpoint of technical scheduling, schedule compression without speeding individual work tasks can be possible by using float in the project's overall schedule (Hogg and Tanis, 2009). However, on a number of projects, schedules are not fully resource loaded. As a result, a properly updated schedule representing the delays will indicate that the project will be completed on time without the need to shorten individual activities (Rifat, 2007). Because of the shorter overall length, schedule compression can cause the contractor to force extra labor for the desired job, allowing the contractor to complete the remaining work. Schedule compression, when combined with overtime, often results in significant productivity losses due to a lack of materials, supplies, or equipment to accommodate the extra work, making task

preparation and coordination difficult, as well as the inability to find experienced labour (Kazaz *et al.*, 2008).

Nature of Project: To achieve high efficiency, each member of a crew must have enough room to perform tasks without interfering with or being influenced by the other members of the crew. When more workers are assigned to a specific task in a limited amount of room, interference is likely to occur, lowering productivity (Kazaz *et al.*, 2008). When several trades are assigned to work in the same place, the likelihood of interference increases, and productivity can suffer as a result. Mismanagement on construction sites causes conflict among the numerous crews and laborers. If the carpenter's structure is incomplete, for example, a steel-fixtured crew must wait before installing reinforcement rods. Labor efficiency is also affected by the types of operations and construction methods used (Attar *et al.*, 2012).

Wellbeing: Accidents have a significant negative effect on labor productivity. At the location, various forms of accidents occur, including one that results in a fatality and a multi-day work stoppage. When an accident causes an injured worker to be hospitalized, the crew on which the injured employee worked is reduced in size. Small injuries caused by nails and steel wires can cause workers to stop working and thereby reduce productivity (ShehataMostafa *et al.*, 2012). Since adequate lighting is needed to function efficiently and because inadequate lighting has negative effects, even insufficient lighting results in decreased productivity. Employing a safety officer assists workers in recognizing and adhering to required safety regulations, which can minimize the number of injuries and thereby increase efficiency (Rifat, 2007).

Quality: Low productivity is caused by factors such as inefficient equipment and poor raw material quality. Inefficient machinery has a poor efficiency rate. Old machinery is prone to breakdowns, and laborers take a long time to finish the job, lowering productivity. The other aspect is poor-quality work materials, since poor materials usually result in unsatisfactory work, which can be rejected by superiors, lowering productivity (Saravanan and Surendar, 2016).

Decision-making factors: The ability and mindset of managers have a significant impact on productivity. And when the latest technologies and skilled personnel are made available, efficiency is

poor in many organizations. Ineffective and insensitive management is the source of low productivity. Experienced and dedicated managers can get unexpected results from ordinary people (Soekiman *et al.*, 2011). Employees' skill and willingness to work determine their job efficiency. Management is the driving force behind both. Advanced technology necessitates skilled laborers who, in turn, work efficiently under the supervision of highly trained managers. The most efficient use of human and technological capital can only be achieved by sound management (Attar *et al.*, 2012).

Level of Experience of Manpower: Literature demonstrates that a lack of work experience is a factor that reduces labor productivity and that labor plays an important role in achieving high productivity. Since labor speed, endurance, and strength decline over time and reduce productivity, contractors should hire enough skilled laborers to be profitable (Henry *et al.*, 2007).

Motivation: One of the most significant factors influencing construction labor efficiency is motivation. When a worker's personal goals are aligned with the company's, he or she is more likely to be motivated. Payment delays, a lack of a financial motivation scheme, a lack of adequate transportation, and a lack of training sessions are all included in this category (Attar *et al.*, 2012).

Supervision: During building, most projects encounter some design, drawing, and specification changes. If sketches or specifications contain errors or are contradictory, productivity is likely to suffer because field laborers are unsure of what needs to be done. As a consequence, the assignment may be postponed, or it may have to be fully stopped and rescheduled before further instructions are received (Dharani, 2015). The supervisor's review of the work is an important step in the process. For example, the contractor cannot pour concrete until the formwork and steel work has been inspected, reducing labor efficiency (Ameh *et al.*, 2011). Supervisors may request that a particular task be reworked if the necessary work is not completed according to the requirements and drawings. Absenteeism by supervisors' halt work for tasks that require their presence, such as casting concrete and backfilling, further delaying inspection of completed work and, as a result, delaying the start of new work.

Management of material and tools: In the building sector, this is one of the most significant factors. When needed materials, supplies, or construction equipment are not available at the correct location and time, productivity will suffer. Since the type and size of construction equipment chosen has a significant impact on the amount of time taken, it is important for site managers to be familiar with the options (Hogg and Tanis, 2009). It is beneficial to choose equipment with the correct specifications and a size most appropriate for the work conditions at a construction site in order to improve job-site efficiency. To accomplish the assigned task effectively, laborers need a minimum number of tools and equipment. Productivity can be harmed if the wrong tools or equipment are provided (Henry *et al.*, 2007). Since laborers must spend extra time moving necessary materials from inconvenient storage sites, the scale of the construction site and the location of material storage have a direct impact on productivity (Ameh *et al.*, 2011).

Project Management Factors: Work scheduling issues, as well as a lack of critical construction equipment or manpower, may lead to a loss of productivity. In most cases, poor preparation of project-initiation procedures results in a loss of labor productivity. In addition, a bad site layout will lead to a decrease in productivity. To get to lunch rooms, rest areas, washrooms, entrances, and exits, workers must walk or drive a long distance, which reduces overall efficiency (Shah Meet *et al.*, 2014).

Natural Factors: Raining on the work site and other geographical conditions are natural factors that influence labor productivity, according to previous research. Other variables, such as power, water, and minerals, have a minor impact on productivity. Extreme weather has been found to have a significant impact on productivity (ShehataMostafa *et al.*, 2012).

External Factors: Weather conditions are an important consideration for any construction project's completion. External work such as formwork, T-shape work, concrete casting, external plastering, external painting, and external tiling suffers from adverse winter weather such as winds and rains, which limit productivity. In certain cases, bad weather completely halts operation (Henry *et al.*, 2007).

Political Factors: High productivity in the construction industry needs law and order, government stability, and other factors. The government's tax policies have an effect on people's willingness to work and plant expansion (Shah Meet *et al.*, 2014).

Payment System at Construction Sites

Payment is the transfer of money, goods, or services in exchange for goods and services in acceptable proportions that have been previously agreed upon by all parties involved. A payment can be made in the form of services exchanged, cash, check, and wire transfer, credit card, or debit card (Cheng *et al.*, 2009). Payment is the lifeblood of construction businesses because performance in any construction activity is dependent on an uninterrupted funds flow. However, steady funds flow is rare, and businesses suffer with the worst cases resulting in payment disputes. The payment disputes give an indication of the nature of the payment problem in the construction industry (Gary *et al.*, 2010).

There are different methods of payments. Payments are made for work done and this is sometimes measured by the time worked i.e. according to the period of time the worker is employed, and sometimes by output. The former is called “piece payments” and the latter “time payments” (Ansah, 2011).

In time payments, a definite sum is paid for a fixed period of time, that is, payments are paid at a fixed rate per hour, day, week; or other period, and each construction worker in a given category receives the same payment irrespective of differences in output while in piece payments, payments depend upon output, each construction worker is paid according to the quantity of work done by him, and irrespective of the time he takes (Kazimu, 2012).

Piece rates, by which the pay of each worker is proportionate to his output, might be thought more satisfactory than time rates, especially from the point of view of the employer and the national economy and they also seem fair to the workers (Judi and Abdul-Rashid, 2010). However, they are not suitable for all kinds of construction work, and also the system is liable to abuse if applied deceitfully. Earnings are usually higher for construction workers on piece rates than for those on

similar work paid on a time basis, and the danger of excessive speed is not great as the workers are not penalized if they fail to reach a given standard or target (Kaka and Lewis, 2003).

Construction workers tend to prefer time rates, though they are parties to many collective agreements which include piece rates where these are suitable for the kind of work done. In addition, the risk of speeding and the greater difficulty of regulating piece rates by collective agreements there may be tendency of piece rates to weaken the solidarity of the workers because of considerable differences in earnings (Eruemegbe, 2015).

Many individual workers, especially those who can achieve high output, favour piece rates or bonus payments which if reasonably fixed, enable them to earn more. Where conditions are suitable employers also prefer piece rates because of their inducement work people to concentrate and to do more work (Aje *et al.*, 2017). The two principal systems of payment in construction industry are time payment system and piece rate system. Other systems called premium plans or profit sharing schemes are used with either of these two systems to remunerate the workers and to provide them incentive payments for increased productivity (Maritz and Robertson, 2012).

Time Payment System

Under this system of payment, construction workers are paid for the amount of time spent on the site job. This is the oldest and most common system and the payments are based on a certain period of time during the course of work (Allen *et al.*, 2006). The period of time may be an hour, a day, a week, a fortnight or a month the payment rate will depend upon the period of time. It must be remembered here that payments are paid after the time fixed for work is completed irrespective of output or completion of the work (Jagboro, 1998). The unit of time may be a day, a week a fortnight or a month. Advantages of this system of payment include avoidance of wasteful handling of materials and tools (Berends and Dhillon, 2004). In the absence of rough handling of machinery, repairs and maintenance expenditure is low. Workers can adjust the pace of work so that there is no injury to their health (Aje *et al.*, 2017).

Meanwhile, disadvantages of time payment system in a construction sites include increases in the cost per unit of production. Under this system, the cost per unit of production is uncertain because

the quantity differs from time to time (Kaka and Lewis, 2003). This system of payment is very difficult to measure the efficiency of construction workers because all the workers of equal status are paid at equal rate (Kaka and Lewis, 2003). As this system does not make any difference between efficient and inefficient workers, it kills the efficiency of efficient workers such that workers do not make proper utilization by their time (Aje *et al.*, 2017).

However, advantages of piece rate payments include: easy to understand and very simple to calculate. Workers get more payments because they produce more. It increases their efficiency and productivity. It increases their remuneration also which improves their standard of living. Under this system, the workers use their machines and equipment with proper care because they feel that if their machine is out of order, their work will be held up and their payments will be low (Ansah, 2011). The payment system also decreases the cost of production because the maximum production is done by the workers in the minimum time. It decreases the cost per unit of production also. As the workers are paid according to their work, they make the best possible utilization of their time. The payment system makes proper distinction between efficient and inefficient workers and at the same time brings industrial peace also because it satisfies both the workers and the employer (Motawa *et al.*, 2008).

Limitations of Piece Rate Payment:

Piece payment system in construction sites, however, subject to the drawbacks which include instability in earnings of workers and they may suffer due to temporary delays or difficulties (Elazouni and Gab-Allah, 2004). They feel insecure and dissatisfied, in order to maximize their earnings, workers work with excessive speed. This may affect their health. It also increases the wastage of materials and wear and tear of machinery. This payment system may create jealousy between efficient and inefficient workers and may lead to industrial disputes (Aje *et al.*, 2017).

However, piece rate payment system is suitable in the following situations: when productivity of the workers is to be increased; where the degree of physical work is more than the mental work; where output can be measured and quality control system exists to discourage low quality production; when methods of production are standardized and the job is of repetitive nature; where work does not require personal skills of higher order (Abeysekera, 2002).

Conclusion

Disputes over payment methods between contractors and site workers are common issue in Nigeria construction sites and this seems to have impact on construction projects. However, thorough literature review conducted in this research concisely discussed the various payment methods available at construction sites and looked at payment methods as one of the factors that may influence construction labour productivity. Hence, there is need to carry out a study on the impact of payment methods on productivity level of construction workers.

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