

An Investigation into the Labour Productivity Trends in the North-West Province of South Africa

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Abstract—The construction industry plays a substantial role in the development of any national economy and it contributes considerably to employment and growth. Notwithstanding its importance, its productivity trends carry great significant effects on national economic growth. Thus, this study seek to investigate the labour productivity trends for the South African construction industry with specific interest in the Northwest Province. The research focuses on construction labour productivity, the labour working conditions and the factors that may impact productivity in the South African construction industry. The research is based on systematic reviewing of selected articles on labour productivity and productivity statistics in South Africa, within the period of 2006 and 2016. The findings revealed management factors, material factors, human/labour factors and technical factors to be the most critical factors affecting labour productivity.

Index Terms—Labour, productivity trends, South Africa, Construction Industry, Northwest Province

I. INTRODUCTION

The construction industry plays a key role generally in every economy. Its range of activities are key drivers in the achievement of socio-economic development goals in the provision of employment and infrastructural development which can uplift any nation's economy. However the South African Statistics the construction industry in South Africa contributes 3.4% to the Gross Domestic Product (GDP). And the Northwest Province contribution 2.2% of GDP in the construction industry, followed by Western Cape at 5.3%, Eastern Cap 4.2%, Northern Cape 2.6%, Free State 2.5%, Kwa Zulu Nata 4.1%, Gauteng 3.3%, Mpumalanga 2.9% and Limpopo 3.30%. Although GDP contribution indicates that the construction performance is poor, hence it has been experiencing cost and time overruns, with low productivity been pointed out as the major cause for projects delays [1].

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Furthermore the Construction Industry Development Board (CIDB) further state that the most significant factors affecting labour productivity in South Africa are wages, transport, workers morale, employee benefits and absence [2]. So the aim of this study is to identify the factors affecting labour productivity in the Northwest Province of South Africa and measures to improve them, as labour productivity is a key factor that affects the construction performance [3].

II. LITERATURE REVIEW

A. Labour Productivity in the Construction Industry

Labour productivity is only defined as the amount of goods and services that a labour produces in a collapsed amount of time according to Mahamid [4]. Labour productivity measurement is typically shown as a ratio or factors, as a percentage, or as a production rate. Hence productivity measurement systems use efficiency, which is the ratio of the effective or useful output to the total input in a task. Notwithstanding the construction industry is a major employer in South Africa, therefore productivity has been flogging on construction sites due to labour unrest, which lead to negative impact on the price and quality of construction as well as the support and morale of workers [5]. Although factors influencing productivity are widely studied hence the need to consider further the factors that affect productivity in building projects [6]; [4], [7] and [8]. To improve productivity, the impact of each of the elements can be assesses using statistical methods and attention afforded to those particular parameters that adversely affect productivity. However, project performance is determined by the productivity on all project work items. The measurement of a few work items is not sufficient to describe the worldwide project productivity. Furthermore, a building project typically is a complex operation involving many parallel and consistent activities [9].

B. Factors affecting Labour Productivity

Various studies in recent times have outline various factors which affects the effectiveness of labour productivity. Alinaitwe et al [6] classified factor impacting on labour productivity as followings: incompetent supervisors, lack of skills of the workers, rework, lack of tools/equipment, poor construction method, poor communication.

Kadir, Lee, Jaafar and Ali [10] classified that, material shortage at site; non-payment to suppliers, causing the stoppage of material delivery to site; change orders by consultants were factor affecting labour productivity in the construction industry.

Makulsawatudom and Emsley [11] identified factor influencing labour productivity such as: lack of material, rework, poor site layout, communication, lack of tools and equipment, incomplete drawings, incomplete supervisors.

Soekiman, Pribadi, Soemardi and Wirahadikusumah [12] identified 20 factors affecting labour productivity in Indonesian construction industry. Kazaz, Manisali and Ulubelyi [13] identified the followings as factor affecting labour productivity in the construction projects such as: working at similar activities, amount and on payment, material management, quality of site management.

Kazaz, Manisali and Ulubelyi [13] identified 25 factors as factors affecting labour productivity in turkey construction industry.

Hickson and Ellis [14] grouped factors affecting labour productivity into fourth groups such as: External factors, Huma/ labour factors, Technology factors, and Management factors, and out of those groups 42 factors were identified as factors effecting labour productivity in Trinidad and Tobago construction industry.

Ghoddousi, Poorafshar, Chileshe and Hosseini [15] classified factors that affect labour productivity into three categories such as: Project nature and working environment, Motivational and Management policies and leadership strategies in the Iranian construction Industry.

Chigara and Moyo [16] identified 40 factors affecting labour productivity in the Zimbabwean construction industry. Enshassi, Mohamed, Mustafa and Mayer [17] classified factors affecting labour productivity into ten group: Motivation factors, Leadership factors, Material factors, Project factors, Manpower, Supervision, Safety factors, External, Quality factors as the most critical factors in Gaza construction industry.

III. RESEARCH METHOD

A. Research Design

This study employed a quantitative research approach. Bryman and Bell [18] stated that quantitative research is a research strategy that indicates the relationship between theory and research and usually emphasizes on how theories were generated. Data were collected using a questionnaire design. Questionnaire was constructed based on the literature. Finding were obtained and examined in relation to literature review. The convenience sampling was preferred and adopted in this study. Moreover, due to the growing number of professionals in NWP, a search was conducted to identify medium on-going projects whereby a large number of responded could be accessed. The identification of medium sites with large number of workers was necessary for the study to be precise.

B. Data Collecting Method

Out of 120 questionnaire send 102 were received back which represents 85% of the overall return rate, 53% of the respondents were males, while 47% were females. Moreover, the return rate for this study was considered adequate for analysis. The structured questionnaire was preferred because of the relative ease of providing standard data suitable for the research quickly and economically [6] and [11]. The questionnaire was built around the factors affecting labour productivity drawn from previous studies. Furthermore, literature focussed factors were classified into four main groups namely: management related factors, materials related factors, human/ labour related factors and technical related factors. Therefore, secondary data was gathered from relevant literature including journal articles,

conference proceedings, textbooks and other documents existing in the public domain.

IV. RESULTS ANALYSIS AND DISCUSSION

A. Respondents Demographics

A total of 102 questionnaires were completed and analysed. And 53% respondent were male and 47% were female. The respondents were made up of Architect (10%), projects managers (11%), construction manager (31%), and quantity surveyor (33 %), engineers and town and regional planner and mining survey and construction (8%). The demographics of respondents who participated in the study shows that they had relevant technical experience to provide valid assessments of the factors presented in the questionnaire.

B. Factors Affecting Labour Productivity

The study noted that numerous factors affecting the construction labour productivity in Northwest Province of South Africa. The results show the factors with significant impact on labour productivity in descending order of importance are as follows: poor communication, lack of incentive program, lack of coordination, lack of supervision, inspection delay, unavailability of material, inefficient equipment, and lack of manpower, shortage of experience, complexity projects, poor organisation, and rework. Those factors with the greatest influence on construction labour productivity are drawn from four group namely: management relates factors (poor communication and lack of incentive program), material related factors (unavailability of material and inefficient equipment), human/ labour related factors (lack of manpower and shortage of experience), Technical related factors (, complexity projects and poor organisation). Table 1 provides details of the breakdown of the ratings for individual and group factors.

Management Related Factors

The findings of this study indicates that management factors affecting labour productivity in the NWP were, incentive program, lack of supervision, lack of coordinating, inspection delay, poor communication and instruction delay. Therefore, the findings of the study support those of Hammed et al [8], who state that lack of incentive program and lack supervision were the management factors affecting labour productivity and Hickson and Ellis [14] and Chigara and Moyo [16] were, instruction delay and inspection delay were factors affecting labour productivity in the construction project

Material Related Factors

The finding of this study indicates that unavailability of material, late deliveries of material and unsuitability of material storage were the material factors affecting labour productivity on the construction projects in the NWP. Therefore, material it is an essential tool because work cannot be accomplished without material, hence the productivity of the construction projects its affected. The finding from the survey supports those of Chigara and Moyo [16], Thomas and Sulhakumar [1], Kadir et al [10].

TABLE 1
RATING OF FACTORS AFFECTING LABOUR
PRODUCTIVITY

Factor Categories	Factors	\bar{x}	σX	R
Management factors	Poor communication	4.43	0.55	1
	Lack of incentive program	4.19	0.56	2
	Lack of coordination	4.1	0.9	3
	Lack of supervision	3.78	0.56	4
	Inspection delay	3.75	0.56	5
	No clarity of instruction	3.75	0.55	6
	Poor relation between managers and workers	3.72	0.69	7
	Instruction delay	3.17	0.81	8
	Lack of training offered to operative	3.16	0.78	9
Material factors	Unavailability of material	4.31	0.69	1
	Inefficient equipment	3.61	0.72	2
	Tool and equipment shortage	3.6	0.79	3
	Late deliveries of material	3.57	0.84	4
	Lack of material	3.51	0.71	5
	Unsuitability of plant and equipment	3.39	0.69	6
	Tools/ equipment breakage	3.3	0.84	7
	Unsuitability if material storage	3.05	0.95	8
Human/ labour factors	Lack of manpower	4.23	8.82	1
	Shortage of experience	4.19	0.85	2
	Not enough rest during the day	3.41	0.83	3
	Labour dissatisfaction	3.33	0.79	4
	Working overtime	3.05	0.85	5
	Physical fatigue	2.81	0.78	6
Technical factors	Complexity projects	4.23	0.67	1
	Poor organisation	4.07	0.77	2
	Rework	3.89	0.66	3
	Poor site layout	3.67	0.78	4
	Incomplete drawing	3.59	0.87	5
	Inclement weather	3.59	0.87	6
	Poor site condition	3.59	0.69	7
	On sit accident	3.41	0.92	8
	Alteration of design during projects completion	3.23	0.88	9

Human/ Labour Related Factors

The findings of this study shows that human/ labour factors affecting labour productivity in the NWP were, shortage of experience labour and labour experience and skill because contractors tend to employ labourers temporally and unable to retain experience labourers, as it affect the labour productivity. Furthermore shows that working overtime and lack of manpower were also human/ labour factors affecting labour productivity on the construction projects, as manpower skill affect labour productivity negatively and proves that sufficient skilled labourers are needed to achieve good productivity. Moreover, the findings of the study support those of Hammad et al [8], El-Gohary and Fayek [7] and Hicksom and Ellies [14].

Technical Related Factors

The finding of this study indicates that poor site layout, rework, project complexity and poor organisation were the technical factors affecting labour productivity on the construction in NWP, as changing of design during on an ongoing projects affect the progress and slow down productivity and decreases productivity and delay the completion of task. Hence, the findings of the study support those of Chigra and Moyo [16], Kadir et al [10] and Thomas and Sudhakumar [1].

V. MEASURES THAT CAN BE TAKEN TO IMPROVE LABOUR PRODUCTIVITY ON CONSTRUCTION PROJECTS

The study revealed measures that can be taken to improve labour productivity in Northwest Province of South Africa in descending order of importance are as follows: on time payment, proper training to the labours, motivation to worker toward projects completion, advance equipment planning, proper and clear supervision, material available, analysing the entire construction process in detail, maintain work discipline, training of supervisor and the employees, advance site layout, systematic planning of funds and advance, regular meeting, clearance of legal document before starting work, establish communication system between employee's and employee's, contractual agreement between employers and employee, adequate facilities to the labour, systematic flow of work, proper and advance material procurement and management. Table 3 provides details of the breakdown of the ratings for individual and group factors.

The finding from survey support those of Attar et al [19] where properly training to labourers; motivation to workers towards project completion; properly and in advance material procurement and management; on time payment to the workers were ways to improve labour productivity in the construction projects. Further, the study of Pheng et al [20] and Hammad et al [8] are in relation were proper training, on time payment and proper and clear supervision were ways to improve labour productivity in the construction projects. The findings of this study shows that on time payment, proper training to the labourers and motivation to worker toward projects completion were the ways to improve labour productivity in NWP construction projects

TABLE 2
RECOMMENDATIONS TO IMPROVE LABOUR
PRODUCTIVITY OF CONSTRUCTION PROJECT

Measures that can be taken to improve labour productivity	\bar{x}	σX	R
On time payment	4.68	0.58	1
Proper training to the labours	4.06	0.28	2
Motivation to worker toward projects completion	4.03	0.17	3
Advance equipment planning	3.94	0.37	4
Proper and clear supervision	3.9	0.43	5
Material available	3.86	0.42	6
Analysing the entire construction process in detail	3.85	0.59	7
Maintain work discipline	3.83	0.58	8
Training of supervisor and the employees	3.82	0.55	9
Advance site layout	3.82	0.52	10
Systematic planning of funds and advance	3.8	0.72	11
Regular meeting	3.79	0.6	12
Clearance of legal document before starting work	3.79	0.55	13
Establish communication system between employee's and employee's	3.78	0.56	14
Contractual agreement between employers and employee	3.76	0.55	15
Adequate facilities to the labour	3.75	0.65	16
Systematic flow of work	3.73	0.55	17
Proper and advance material procurement and management	3.41	0.64	18

VI. CONCLUSION AND RECOMMEDATION

Poor productivity is high and often result in affect the development of the construction industry. The construction organizations must have a clear mission and vision to formulate, implement and evaluate labour productivity, as they are many factors that can affect the labour productivity on the construction projects. Hence, these factors affect projects throughout their life cycles, such as cash flow of projects, material and equipment cost, site preparation, percentage of orders delivered late.

Therefore, the construction team need to be aware of the factors stated above in order to minimise the poor productivity on construction projects: therefore the following steps are recommended:

- Construction firm must pay closer attention to grooming management personnel in order to develop communication with the workforce and minimise coast leakage.
- To provide training courses and seminars in the topics that will improve productivity in construction projects.
- To improve supervision
- To make programs simple in operation and easily understood.
- To achieve desired results, time required to implement change orders and to make corrections in drawings and

specifications should be estimated and scheduled without affecting the project-time completion.

- Change orders and design error should be avoided as much as possible. These factors can be costly and time consuming if the work has been done. Work sequences can also be affected due to rework.
- To provide a materials supply schedule for each project.

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