CONSTRUCTION WORKERS' SKILL DEVELOPMENT: A STRATEGY FOR IMPROVING CAPACITY AND PRODUCTIVITY IN SOUTH AFRICA

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Abstract−
This paper examines construction workers' skills development as a strategy for building capacity and improving work productivity in South Africa. Whilst there are other factors that could influence workers' skills development, this study focused on human work skill behaviour factors in the construction industry. A descriptive research methodology using emailed questionnaires to collect data was used. Collected data were analysed using two statistical methods.The first one used the mean values to establish data acceptance and the second, the relative importance index, was used grade the data Twenty three factors, narrowed down to six main behaviours were found to be significant in influencing construction workers' capacity to improve productivity. The six behaviours included educational backgrounds, attitude towards own skills development, working conditions, the organisation's role in enhancing employee capacity and goal setting. Based on the results of the study, it was recommended that construction project organisations could incorporate the identified skill development factors in their organisations in order to build their skill capacity to improve construction productivity in South Africa. It also was recommended that, governments could use identified factors in their national strategies and policies for construction workers' empowerment and productivity improvement to create wealth in the national economy.

Keywords: Skill development factors, Construction workers, Capacity building, Productivity, South Africa.

JEL Classification: M11, M53, L74 & O15

1. INTRODUCTION

This paper examines construction workers' skill development as a strategy for building worker capacity and improving productivity. According to Parkin, Tutesigensi and Büyükalp (2009), a motivated unskilled worker may not have the required ability to perform well and improve construction productivity. Kazaz, Manisali and Ulubeyli (2008) in this regard note that despite such motivation, there is need for competent management to ensure that the worker gets the necessary skills to enhance construction productivity. Hanafi, Khalid, Razak and Abdullah (2010) found that competency of site supervisors is an important contributing factor influencing labour productivity in installing on-site prefabricated components. This implies that skills acquisition is vital for capacity building and productivity improvement. Relevant skills are needed not only in labour management and organisation, but also in the inspection and approval of completed work. They are also required in the organisation and coordination of work, supervision of main and sub-contractors' work if improvement in workers' productivity has to be realised (Orando, 2013). Therefore, skills development, in addition to motivation, is vital with regard to capacity and work productivity.

This study identifies capacity and skill development factors that may be incorporated in a workplace in order to improve worker capacity and productivity in South Africa. Factors related to workers' educational backgrounds, attitude towards own skills development, working conditions, the organisation's role in enhancing employee capacity and goal setting are explored. The nature of construction work tasks is also examined.

2. LITERATURE REVIEW

Several authors (Orando; 2013; Erasmus, Loedolff, Mda & Nel, 2016; Schenk, 2016) note that a worker's educational background, attitude towards own skills development, the organisation where one works, the work environment and the nature of construction work tasks play a major role in enhancing an employees' skills development for improved productivity.

2.1. Workers' educational background

Before getting employment as a construction worker, it is important that one has some basic education and is literate. Construction work usually varies from very simple and basic to very complex. For example, a mason tasked with the construction of a gravel road builds simple structures like retaining walls or culverts on a small scale. Such a mason performs a job where technical demands are moderate. Another job may require a mason to work on the construction of a large and complex power station where reading complex drawings is required and finishing work to the required standards is needed. This kind of project will demand literacy and technical skills, including reading, as part of communication skills (Orando, 2013).This shows that basic education and literacy are vital for productivity in the construction industry. Erasmus *et al.* (2016) note in this regard that apart from the basic technical skills, workers should also have communication, problem-solving and interpersonal skills.

2.2. Workers' attitude towards improving their own skills

Schenk (2016) notes that workers have a responsibility to play in their own skills development. Among several other things they do not only have to accept ownership of their tasks but they also have to keep their skills and knowledge current, help establish and meet performance objectives in addition to accepting developmental opportunities and support available to them. This means that workers ought to have a positive attitude towards their own skills development.

With regard to attitude, McGregor's human theory Y is important. Wong (2007) notes that theory Y supports the view that workers want to do well and that most workers will meet high-performance expectations when appropriately motivated in a supportive climate. It further maintains that workers are creative, imaginative, ambitious and committed to meeting organisational goals. They are also self-disciplined and self-directed, desire responsibility, accept it willingly and are motivated by fulfilment of their own needs, including skills development needs.

Theory Y further assumes that the physical and mental effort involved in work is natural and that workers actively seek to engage in work. It also is assumed that close supervision and the threat of punishment are not the only means, or even the best means, for inducing workers to exert productive effort. Instead, if given the opportunity, workers will display self-motivation to put forth the effort necessary to achieve the organisational goals. This means that avoiding responsibility is not an inherent quality of human nature, as workers seek responsibility under motivated conditions. According to McGregor's theory Y, the ability to be innovative and creative exists within the human population and rather than workers valuing security above all other rewards at work, they desire to satisfy self-esteem and self-actualisation needs (Barnett, 2011).

According to Wong (2007), theory Y supports the idea that workers want to do well and that most workers will meet high-performance expectations when appropriately motivated in a supportive climate and that workers are creative, imaginative, ambitious and committed to meeting organisational goals, are self-disciplined and self-directed, desire responsibility and accept it willingly and are motivated by higher-level needs such as training to acquire the desired work experience (self-esteem and self-actualisation). This is the proposition that this paper is based on. It is proposed that most workers already have their physical and safety needs met and that the motivational emphasis should be shifted to the social, ego and self-actualisation needs. It would seem that staff ability to willingly accept responsibility, training at work, work experience and self-esteem are important factors for building capacity and improving construction productivity.

2.3. The role of construction organisations towards improving worker skills

Organisations play a critical role in empowering workers with vital skills. Schenk (2016) notes the need for organisations to create a work environment that supports training and learning. In this regard it is important for organisations to allow workers time to train and provide resources for development and training.

Construction organisations have to provide opportunities for the upper-level needs to be met in the workplace. Without such opportunities, workers would not be

satisfied or motivated in their jobs. According to Perry, Mesch and Paarlberg (2006) the upper-level needs could include achievement, recognition, the work itself, responsibility, advancement and growth. There are a number of ways in which construction organisations could train their workers. For example, Enshassi, Mohamed and Ekarriri (2009) prefer staff mentoring at work as a training method. Uwakweh (2005) proposes work facilitation and achievement orientation support as training methods. Fester and Haupt (2006), Verster, Hauptfleisch and Kotzé (2008) indicate that apprentice and workplace learning as a preferred method of training construction workers. The skill advancement and growth of construction workers could be achieved by construction organisations offering staff mentoring at work, self-efficacy, learning and coaching at work.

2.4. The nature of construction work tasks

According to Ramlall (2004), the nature of construction tasks is important in motivating and inspiring construction workers to improve their productivity. Perry et al (2006) propose a set of features that should be built into jobs/tasks in order to be satisfying and motivating. The features proposed include the notions of horizontally enlarging work tasks to provide motivation. Smith (2016) indicates in this regard that the organisation increases the number of tasks a worker does. Thus, simple additions to specific tasks are made.

Grant (2007) observes that the job characteristics theory could be used to identify the nature of work tasks that can inspire and motivate construction workers to improve their productivity. This observance on the job characteristics theory is based on the idea that the task itself is key to employee motivation. It is important because the way a task is designed can either motivate or demotivate the worker. In this regard Kreitner and Kinicki (2007) are of the view that the tasks must be challenging, independently designed by the worker, interesting and fairly varied.

2.5. Work conditions

Hemamalini and Washington (2014) introduce the expectancy and equity theory and argue that work conditions are equally important for influencing conditions that improve worker capacity and skill development. The expectancy and equity theory of motivation is based on equity and fairness in a workplace. It is a theory

of motivation based on the beliefs and values that construction workers are likely to be more satisfied if they feel their good performance will be equitably rewarded. According to Hemalini and Washingtone (2014), a worker chooses among alternative courses of action, which are lawfully related to physiological events occurring contemporaneously with behaviour. Work quality, work economy and work equal opportunity could be part of that equity and fairness at work as advocated by expectancy and equity theory of motivation. These factors are identified as factors for skill capacity and productivity improvement.

2.6. Goal setting

Goal setting is another way construction workers could improve their productivity. Goal setting theory places specific emphasis on the importance of conscious goals in explaining motivated behaviour (Orando, 2013). Latham (2006) states that the goal setting theory depends on three factors, namely the level of difficulty of the task, the specificity of the task and commitment to the task performance.

Level of difficulty in this regard refers to the extent to which the job or task is challenging (Kreitner & Kinicki, 2007). According to Gravett (2001) a challenging task is thought-provoking and stimulates the worker's effort or interest to accomplish it. With regard to a task's specificity, Erasmus *et al*. (2016) indicate that the task given should be relevant (specific) to the job the worker performs. This implies that the training and learning experience by the worker directly relates to the duties and tasks performed in the job situation. It is this relationship that motivates the worker to train and eventually perform better. The third factor (commitment to task performance) relates to the worker's enthusiasm to perform. This means that the worker views the task as important and commits himself to execute it without any pressure being exerted (Kreitner & Kinicki, 2007).

3. METHODOLOGY

Because the researchers wanted to examine the construction workers' situation as it was, a descriptive survey technique was employed to gather data from 100 construction industry operatives. Leedy and Ormrod (2010) note that descriptive

studies entail the exploration of possible correlations among two or more phenomena and do not involve modification of situations being investigated. Such studies do not determine cause and effect relationship. The data obtained was evaluated using a Likert scale of one to five as developed by Kazaz *et al.* (2008), where one represents strongly disagree and five strongly agree. It is thus a nominal scale that enables the researcher to determine the mode, the percentage value and the chi-square. Twenty three capacity and skill development factors, identified in the literature in South Africa, were evaluated. Two statistical methods were used to analyse the data provided by the questionnaire. The first was acquiring percentage values by the frequencies of the answers received and the second was to calculate a relative importance index (RII) of the behavioural factors. The percentage frequencies of answers are used for ranking the behaviour factors, where two or more factors have the same RII.

While establishing the perceived capacity and skill factors, key skill indicators on a Likert scale of 1-5 were used as the instrument and this eliminated those capacity and skill factors, which measured less than 2.60 on the Likert scale, as shown in Table 1. The correspondence frequencies and a chi-square test were used to measure the factors and behaviours. A combination of this methodology, using the Statistical Package for the Social Sciences (SPSS) software, was applied in this research.

Table 1 The evaluation scale for the data

Level of significance	**Level of importance**	**Scale value**
Not significant **(NS)**	Not important **(NI)**	≥1.80
Somewhat significant **(SS**)	Somewhat important **(SI)**	1.80 ≤ 2.60
Significant **(S)**	Important **(I)**	2.60 ≤ 3.40
Very significant **(VS)**	Very important **(VI)**	3.40 ≤ 4.20
Extremely significant **(ES)**	Extremely important **(EI)**	4.20 ≤ 5.00

Adapted from Kazaz *et al.* (2008:98)

3.1. Sample

The research covered both private and public sector work, civil engineering and building projects, as well as the different types of facilities (e.g. commercial or educational). It focused on construction projects within South Africa to ensure that potential variations due to the national context are controlled and kept uniform, as much as possible and to ensure that the findings reflected the general trend across South Africa.

The research population consisted of the construction workers in the South African construction industry. The targeted population comprised of contractors, consulting professionals, academics, local government officials, government built-environment professionals and construction workers, totalling 100 in number.

3.2. Measuring instrument

In order to collect the relevant data, a questionnaire with 23 items was developed to measure construction workers' perception with regard to the identified skills development factors. The questionnaires were circulated by email to the stratified random sample.

The questionnaire was subdivided into three sections, related to the objectives of the study. The first section related to the respondents' profile, while the second one focused on human capacity and skills development. The third section solicited respondents' general comments regarding the study.

The data collected from the A to C sections of questionnaires were analysed using SPSS and the relative importance index (RII), in order to determine the ranking of the capacity and skill development factors identified in the study.

4. VALIDITY AND RELIABILITY

In order to establish the validity of the study, the chi-square test was carried out. According to Leedy and Ormrod (2010) the chi-squared test is used to establish the relationship of the variables studied. It assesses whether an association exists between two or more variables. A less than .05 chi-square value indicates a strong relationship between the variables. On the other hand values above .05 indicate

absence of a relationship. In this case the test was found to be less than .05, indicating 95 percent confidence level in the results.

5. RESULTS

The data from the results of the capacity and skill development factors, which influence improved construction productivity in South Africa, are now presented and described.

5.1. The capacity and skill development factors which influence improved productivity in South Africa

The result of the capacity and skill development factors, which influence construction productivity, are presented in Table 2 and discussed. Construction worker attitude factors were identified and evaluated as extremely significant; all four of them were found to be extremely significant, implying that they are all important, as discussed below.

Table 2 Capacity and construction worker skill development factors

Item: Capacity and skill development factors	Rank in total	Effect level	Min	Max	Mean	SD
Construction worker attitude						
Ability and willingness for responsibility and accountability	1	ES	3	5	4.49	0.612
Staff training at work	2	ES	1	5	4.36	0.753
Staff work experience	3	ES	2	5	4.33	0.66
Staff self esteem	4	ES	2	5	4.33	0.66
Work conditions						
Work quality	5	ES	3	5	4.33	0.613
Work opportunity	6	VS	1	5	4.15	0.744
Organisational Skill development for staff						
Staff mentoring at work	7	VS	1	5	4.13	0.851
Staff self-efficacy	8	VS	3	5	4.13	0.672
Staff learning at work	9	VS	2	5	4.12	0.789
Staff coaching at work	10	VS	1	5	4.07	0.91
Nature of Tasks (roles)						
Independence of tasks	11	VS	2	5	4.06	0.833
Interesting tasks	12	VS	1	5	4.04	0.824
Goal setting						

Task performance commitment	13	VS	2	5	4.01	0.728
Work conditions						
Work economy	14	VS	2	5	4.00	0.921
Goal setting						
Task specificity	15	VS	1	5	4.00	0.835
Task significance	16	VS	1	5	3.96	0.895
Construction worker educational background						
Basic education level of staff	17	VS	2	5	3.96	0.824
Literacy level of staff	18	VS	2	5	3.91	0.818
Nature of Tasks (roles)						
Challenging task	19	VS	1	5	3.88	0.729
Opportunity to plan and handle a task	20	VS	2	5	3.88	0.663
Use of own knowledge and idea at performing a task	21	VS	2	5	3.76	0.653
Task difficulty	22	VS	1	5	3.69	0.802
Task variety	23	VS	2	5	3.61	0.758
Average		**VS**			**4.05**	

5.1.1 Construction worker attitude skill factors (ES-4.49 to ES-4.33)

Construction worker attitude factors group consists of four sub-factors, namely worker ability to willingly accept responsibility and accountability (ES-4.49), staff training at work (ES-4.36), staff work experience (ES-4.33) and staff self-esteem ES-4.33). These are factors seem to be part of their needs as workers. These findings confirm the idea that workers want to do well and that most workers will meet high-performance expectations when appropriately motivated in a supportive climate and that workers are creative, imaginative, ambitious and committed to meeting organisational goals, are self-disciplined and self-directed, desire responsibility and accept it willingly, are motivated by higher-level needs such as training to acquire the desired work experience (self-esteem and self-actualisation). Table 2 presents construction worker attitude factors as the first and most important capacity and skills improvement factors. It shows that if these skills factors are incorporated in a workplace, capacity and productivity could improve and it answers objective two of this study.

5.1.2 Work conditions skill factors (ES-4.33 to VS-4.00)

Work conditions skill factors group consists of three sub-skill factors, namely work quality extremely significant (ES-4.33), work opportunity (VS-4.14) and work economy (VS-4.00). These work conditions factors were evaluated as extremely significant to very significant. They seem to show that if there is equity and fairness at the work place, a construction worker may be motivated to believe and value his work such that there is satisfaction and good performance equitable to the reward. Table 2 shows work conditions factors group as the second most important capacity and skill factors, which if made mandatory in a workplace could enable construction workers to build work capacity and improve productivity and it answers objective three of this study.

5.1.3 Organisational skill development for staff (VS-4.13 to VS-4.07)

Organisational skill development for staff factors group consists of four sub-skill factors, namely staff mentoring at work had a mean index of very significant (VS-4.13), staff self-efficacy with very significant (VS-4.13), staff learning at work very significant (VS-4.12) and staff coaching at work very (VS-4.07). These factors were all evaluated as very significant and ranked third-most important worker capacity and skill development factors for improving productivity. Table 2 shows that internal worker training in organisations are important building capacity and improving productivity and it answers objective four of this study.

5.1.4 Nature of tasks (VS-4.01 to VS-3.61)

Nature of tasks (roles) group consists of ten sub-skill factors: independence of tasks very significant (VS-4.06), interesting task very significant (VS-4.04), task performance commitment very significant (VS-4.01), task specificity very significant (VS-4.00) and task significance very significant (VS-3.96). The above three nature of task group factors were found to be more important than educational back ground factors and made the nature of task roles third most important factors. However, these 5 nature of task factors although still very significant with (VS-3.88 to VS-3.61), namely challenging task very significant (VS-3.88), opportunity to plan tasks (VS-3.88), use of own knowledge for task performance (VS-3.76), task difficulty (VS-3.69) and task variety (VS-3.61) were

found to be less important than educational background factors, although still very significant as factors and answers objective six of this study. Table 2 shows task related factors are very significant and they influence worker capacity skill development in South Africa.

5.1.5 Goal setting (VS-4.06 to VS-3.96)

Goal setting (roles) group consists of three sub-skill factors: task performance commitment very significant (VS-4.06), task specificity very significant (VS-4.00), task significance very significant (VS-3.96). The above three goal setting task group factors were found to be more important than educational back ground factors and made the goal setting task roles fifth most important factors. However, these three goal setting task factors (VS-4.06 to VS-3.96) were found to be more important than educational background factors, although still very significant as factors and answers objective five of this study. Table 2 shows goal setting factors are very significant and they influence worker capacity skill development in South Africa.

5.1.6 Construction worker educational background (VS-3.96 to VS-3.91)

Construction worker educational background factors group consists of two sub-skill factors, namely basic educational level of staff very significant (VS-3.96) and literacy level of staff (VS-3.91).These construction worker educational background factors were all evaluated as very significant. The ability to read and having some technical knowledge is very important in construction development processes. Table 2 shows construction worker educational background factors group as the sixth most important capacity and skill factors, which if made mandatory in a workplace could enable construction workers to build work capacity and improve productivity and it answers objective one of this study.

According to the respondents, if all the above worker and skill development factors are incorporated in a workplace, they should significantly improve work productivity in South Africa.

6. CONCLUSION

This study focused on construction workers' skills development as a strategy for building capacity and improving work productivity. It identified 23 capacity skill

development factors that could be incorporated in a workplace environment to improve productivity in South Africa. Analysed data showed that good educational background of a construction and worker skill attitude are very important for work productivity improvement. It also emerged among several other things, that to enhance productivity in construction organisations, it is vital for the organisation to internally train, provide fair and equitable work conditions for the staff. It is envisaged that construction project organisations could incorporate the identified skills in their organisations to build capacity and that government could also use the identified factors in the national strategies and policies for skills development. There is however need to note that this the research was limited to human work skill behaviour factors in construction; though there other factors that influence worker skill development at the workplace.

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