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TECHNICAL HUMAN CAPITAL OBSOLESCENCE AND AGE RELATIONSHIP IN THE BUILDING CONSTRUCTION INDUSTRY: A CASE OF NIGERIA

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ABSTRACT: *The Building Construction Industry (BCI) is among the businesses that depend on the agility and viability of the workforce. Consequently, it invests heavenly in the development of employees' knowledge and skills, otherwise known as human capital. However, individual's human capital is bound to deteriorate owning to atrophy (nonuse of skills) and inevitable changes, which could be as a result of ageing process, wear, injuries, and/or illnesses, in the individual. This deterioration is known technical human capital obsolescence. Thus, using descriptive study, this paper investigates technical human capital obsolescence in the BCI and its relationship with workers' aging. Three research questions guided the study and questionnaire was administered to 387 randomly selected BCI workers. 278 questionnaires representing 71.83 percent were successfully completed and returned. The data were analyzed using mean, standard deviation, Pearson Correlation Coefficient, Kruskal-Wallis H test statistics and SPSS software. The findings indicate, among other things, that, individual's technical obsolescence due to wear is not a function of age. It is recommended that the industry and her workers intermittently evaluate their skills with the view of finding the specific obsolescence and providing measure(s) to alleviate its effects in the industry.*

KEYWORDS: technical, human capital, obsolescence, age relationship, building construction, industry, Nigeria

INTRODUCTION

Economic development and competitiveness of any country, largely, depend on the viability of her workforce. This is also true in many businesses like the Building Construction Industry (BCI). As a result, many businesses invest heavily on the development of their employees' human capital (knowledge and/or skills) with the hope of increasing productivities.Thus, the major tenet of human capital theory is the study of investment and productivity (Gemeno, Folta, Cooper, & Woo, 1997). The theory believes that investment on education, and by extension, in individual increases productivity and impacts earnings positively (Eva, 2018). Regrettably, human capitals acquired through investment are vulnerable to obsolescence, thereby jeopardizing productivity. As acknowledged by Sandborn 2015), obsolescence of human skills is a critical problem for organizations. Human capital obsolescence (HCO) may lead to job loss, lack of job satisfaction, unemployment, poor productivity, poor craftsmanship, and/or poor general performance of the economy. It could be technical or economic obsolescence (Janβen &Gellner, 2009; de Grip & van Loo, 2001). While the former, which is the focus of this paper, is obsolescence that originates from an individual because of atrophy (nonuse of skills) and/or wear, the latter is because of technological development (van Loo, de Grip, & Steur, 2001).

The BCI is an occupation that is very vulnerable to HCO because it operates in circumstances that encourage obsolescence. The industry is unique and changing constantly (Edum-Fortwe & McCaffer, 2000). It is uniquely labor-intensive and relies on fragmented specialized skills that are often changing per a project (Glover, Long, Haas, & Alemany, 1999). Records (e.g, Palmersheim, 2012; Fagbenle & Oluwunmi, 2010) show that construction workers in both developed and developing countries have either died or suffered injuries at work place. The importance of having a viable BCI, especially in a developing economy like Nigeria cannot be neglected. The industry through creation of physical assets counts for a significant percentage of Gross Development Product (GDP) in both developed and developing countries (Winch, 2010; Debrah & Ofori, 2006). In Nigeria, it accounted for about 70 percent of fixed capital formation and contributed 3 percent of the GDP (Adeyemi, Aina & Olanipeku, 2006) more than a decade ago. As a result, the study of the HCO in the industry in Nigeria has never been more relevant.

Additionally, there is dearth of study targeting HCO in specific occupations like the BCI in a developing country. As observed by McGuiness, Pouliakas and Redmond (2017), research in skills mismatch, which include skill obsolescence in the developing countries is at an early stage in the developing countries. Some available studies in HCO study only developed economies, clusters of occupations using "wage earning" equations that vary per occupation, and evaluated general skills to the detriment of in-depth specific occupational skills. The absence of HCO studies on specific occupational skills is not because it is not relevant, but probably because the authors of the existing studies may have little or no in-depth knowledge in specific occupations like BCI. In another development, there are contradictions in literatures on the vulnerability of obsolescence. While Allen and de Grip (2007) and others support that older workers are most vulnerable to the skills, Murillo (2011) indicates that workers with higher educational attainments suffer more. Schulz and RoBnagel (2010) also pointed out that age has no any negative effect on obsolescence, but nonetheless, suggested further investigation to clarify the contradictions.

This paper, therefore, studied specific occupational skills in BCI using a direct method - asking workers directly about their skills (de Grip, 2006) approach to account for technical human capital obsolescence that is not yet perceived by the workers themselves (van Loo et al, 2001), the relationship between workers' age and their skills obsolescence, and the obsolescence across age groups. The following research questions guided the study:

R1. To what extent does technical obsolescence occur in the BCI in Nigeria?
R2. What is the relationship between workers' age and their skills obsolescence?
R3. What is the nature of the distribution of obsolescence across different age categories?

METHODS

Design and Area of Study

This is a descriptive study focusing the identifying whether there is any relationship between worker technical human capital obsolescence and their age. The study was conducted using survey research design. The area of this study was Nigeria. However, the study was further delineated to Southern Nigeria. The subjects of the study were selected from the three regional states headquarters – Enugu State in Southeast, Lagos State in Southwest, and Rivers State in Southsouth Nigeria that make up the Southern Nigeria. Furthermore, the area is restricted to the metro cities of the regional headquarters – Enugu, Lagos, and Port Harcourt metros. These states and the selected metro cities share common characteristics in terms of culture, weather, building structures, and building practices/codes.

Population of the Study

The population of the study comprised workers in the BCI in the metro cities of the regional headquarters in Southern Nigeria that specialize in the construction of residential bungalow buildings with a particular focus on Carpentry/Joinery, Electrical, Masonry, and Plumbing trade sectors. However, based on the statistics published by the Nigerian National Bureau of Statistics (NNBS, 2010), the household distribution of employed person by economic sector and state in the country shows a population of workers employed in all the construction sector as 40,394, 128,723, and 67,058 for Enugu, Lagos, and River State respectively, giving a total of 236,175. There was no documentation on the BCI workers in the metro cities of the regional headquarters; hence, the overall population of the construction workers in the regional headquarters of Southern Nigeria was used as the population of the study.

Sampling Technique and Size

The random sampling technique was used for the selection of participants for the study. The participants were randomly selected with the help of three research assistants who are practicing building construction professionals and very knowledgeable in the industry. These assistants helped in identifying active professional who attended, at least, secondary education and are literate enough to complete the questionnaire. Availability and accessibility during the time of the study informed the selection of the participants. Using sample size calculator with a large population of 20,000, the confidence level of 95percent, confidence interval or margin of error of plus/minus 5 (Creative Research System (CRS), 2013) a sample size 387 participants were identified. Consequently, a total of 387 questionnaires was disseminated among which 278, representing 71.83 percent, were successfully completed and returned.

Instrumentation and Procedures for the Collection of Data

Structured questionnaire was used for the collection of quantitative data. Section A was on respondents' personal data with respect to sex, educational qualification/training, length of service, age, and area of specialization. Section B was made of response items for wear (personal injury or sickness), skills inherent in the building construction industry, and on training activities. The items

were designed to provide answers to the research questions. A five-point Likert scale was used to determine the frequency of personal injury or illness and training activities using response options of Very Much Often, Much Often, Often, Rarely, and Never, while Very Little, Little, Quite Some, Fairly Much, Very Much, and Not Applicable (NA) options were used as responses to the question "How much of the knowledge and skills you acquired during schooling and/or apprentice can you still apply on your current job?" (Blechinger & Pfeiffer, 2000).

Data Analysis

Section A of the questionnaire was analyzed using frequency count and percentage to determine participants' response to those items. Section B of the questionnaire was analyzed using mean, standard deviation, Pearson Correlation Coefficient (r), and Kruskal-Wallis H Test statistic at the 0.05 level of significance. To make a decision on the items on the issues relating to the degree of obsolescence – extent of wears and atrophy, the real limit of numbers were used to interpret the mean response to each item. To determine the extent of personal wear, the mean and standard deviation of the response on each item were computed. The corresponding mean value with the degree or extent of personal wear in the industry indicates the level of obsolescence attributed to wear. Hence, providing answers to Research Question 1. The mean and the standard deviation of response to the atrophy items were calculated and used in determining the degree or the extent of atrophy in the industry. Less frequency of use of the knowledge and skills causes higher degree or extent of the obsolescence. In other words, the little uses of the skills results to higher degree of the atrophy. Therefore, the corresponding mean value with the degree or extent of the atrophy indicates the level of the obsolescence as a result of atrophy. To provide answers to Research Question 2, Spearman Correlation Coefficient was used to analyze age and obsolescence relationship. The Kruskal-Wallis H test was performed for R3.

RESULTS

Respondents indicated very little degree ($\overline{X}$ = 1.50 – 2.49) of evidence of wear. On the atrophy, thirty items have mean ranging from 2.50 - 3.49 and twenty-nine items with mean ranging from 1.50 – 2.49 indicating that the respondents have "little" and "very little" degrees of obsolescence in thirty and twenty-nine items respectively. On R2, the results show that practitioner's age has a weak correlation with wear (sig (2-tail) *p-value* = 0.390; Pearson's *r* = 0.052), but not significant at p > 0.05, and a negative correlation with skill atrophy (sig (2-tail) *p-value* = 0.024; Pearson's *r* = -0.135). On the R3, the Kruskal-Wallis H test showed that there was a statistically significant difference (χ^2 (4) = 16.057, *p* =.003) in the age groups responses to the wear items and on atrophy (χ^2 (4) = 21.031, p =.000). Following statistical significant, a pairwise comparison was conducted and the results indicate, for wear, a difference (p = 0.033) between 26-35 and 46-55 age and (p =0. 011) between the age group 26-35 and 18-26. For atrophy, the results indicate significant differences (p =.049; p =.011) between groups 26-32 and 46-55, and 26-35 and 18-25, respectively.

DISCUSSION AND CONCLUSION

The BCI is predominantly male occupation. Males constituted 89.21 percent (n = 248) of the population as against 10.79 percent (n = 30) that are females. Construction industry, both in developed and developing countries, is a sector that is highly dominated by men. In other words, women are underrepresented in the industry (Dainty, Bagilhole, & Neale, 2001; Shu-Ling, & Sexton, 2010). This is, perhaps, because the construction industry "emerges as being both structurally and culturally "male" in orientation, where long working hours and expectations of geographical flexibility, support a workplace culture of inflexibility and discrimination" (Shu-Ling, & Sexton, 2010, p. 299).

Similarly, the older individuals are not attracted to or retained in the industry either, probably, because of the working conditions in the industry. The oldest top two age bracket (46-55 and 56 and above) were under represented. The results indicate that workers that are 46-55 years old constitutes 14.08 percent (n = 39) while 56 years and above constituted only 2.89 percent (n = 8) of the total population (n=278). The age of 26-35 years with a representation of 36.10 percent (n = 100) of the population could be considered as a prime age working in the industry as workers start exiting the profession from age 35 and above.

The subsequent age brackets, which are 36-45 (31.77%, n = 88), 46-55 (14.08%, n = 39), and 56 and above (2.89%, n = 8) indicate a quantum drop in the number of workers within the subsequent age bracket or exit of workers as they grow older. Thus, very few workers remain in the profession until the retirement age of 65 years. However, the concentration of workers between the age 26 and 45 years is similar to the age distribution of respondents in a recent study conducted by Kum, Cowen, and Karodia (2014) where the age of the respondent between the age of 21 and 30, and 40 and above constituted 78 percent and 8 percent of the respondents respectively. The younger age groups forming over three-quarters of the total workforce in the industry support the assertion by Gimpelson and Kapeliushnikov (2017) that the younger workforce is more productive, entrepreneurial, and innovative than their older counterparts. This also implies that the number of baby boomers in active workforce is dwindling.

Age is very important when an employer is making any decision about productivity. As a result, the research question two provides information on the kind of relationship age has with obsolescence. The results indicate that there is a weak scientific significance correlation (sig (2-tail) V =.390; Pearson's r = .052) between individual's age and his wear. In other words, individual's wear is not a function of age. First of all, it is worth noting that 46 years and above constituted only 16.97 percent of the population of the study and could have influenced the outcome. This notwithstanding, the finding is in contrary to the general assumption that as the individual grows older, he/she becomes more vulnerable to work related wear. The finding also contradicts some findings in the literatures (JanBen & Backes-Gellner, 2009; Allen & De Grip, 2007; Syed, 2007; Alders, 2005; van Loo, de Grip, & De Steur, 2001) in age related studies, which associated old age in the workforce with some negative outcomes. However, it should be

acknowledged that many of the studies are not on workers wear, which is a technical obsolescence that occur as a result of a workers' aging process, injuries and/or illnesses. On the other hand, this finding is in congruence with a related study on the effect of age and participation in training by Schulz and RoBnagel (2010) who found that there was no scientific significance difference, F (2, 467) = 8.86, p>0.42, in participating in training as a function of age.

Concerning the atrophy, the result indicates that worker's age has a negative correlation (sig (2-tail) *V* =.024; Pearson's *r* = -. 135) at 0.05 level of significance with the worker's skills atrophy. This means that as worker's age increases, his/her skills atrophy decreases or the tendency of his becoming obsolescence due to none or insufficient use of skills decreases. In this particular circumstance, the decrease in skills atrophy with increase in age could be attributed to two things, (1) increase in skills due to increase in professional experience (Arrazola, Hevia, Risueño, & Sanz, 2004) and (2) the exit of older workers from the profession before their retirement age. Thus, in this study, individuals start leaving the profession in a large number at age 45 and above. Consequently, this trend might have affected the result as very few older individuals that are 56 years and older constituted 2.89% (n = 88) of the population of the study.

As stated earlier, when making decisions about productivity, age is an important factor. So many studies have associated age with some negativities. For example, Keely (2007) stated that older workers are less likely to participate in retraining; Syed (2007) states that training intensity decreases with age; JanBen and Beckens-Gellner affirm that older workers invest less time accumulating human capital associated with recent technology, as a result, they suffer negatively and have less recent vintage of human capital (Allen & de Grip, 2007) and become acute to obsolescence (van Loo, et al, 2001). I contrary, van Loo,(2007) found that younger workers under the age of 30 years lose 8 percent yearly average of their skills and knowledge as against 1 percent that exist among workers that are 56 years and older. It is against this backdrop that research question nine was set to find the nature of the distribution of obsolescence across different age groups in the BCI.

The result tested at p > 0.05 level of significance indicates that there is a statistical difference (χ^2 (4) = 16.057, *p* =. 003) between the age groups and their human capital obsolescence – wear. Similarly, there is also a statistical difference (χ^2 (4) = 21.031, p = 0.000) between the age groups and their human capital atrophy. Therefore, workers' human capital obsolescence can be the function of age. Following the evidence of the statistical difference in both cases, further analyses reveal that statistical evidence exists between the age groups 26-35 and 46-55; 26-35 and 18-25, for the wear and between the age groups 26-35 and 46-55; 26-35 and 56-above, for the atrophy. In each situation, the disparity exists between age group 26-36 and other identified age groups (46-55, 18-25, and 56-above).

Interestingly, in the absence of difference in wear between 18-25 age group, which is a younger group that can withstand more wear, all other differences are among the older workers. Based on this and evident in the literature concerning the vulnerability of older workers, it could be

concluded that the skills and knowledge of older worker suffer more obsolescence than younger workers. Specifically, between the age groups 26-35 and 46-55, the 46-55 suffers more; between the age groups 26-35 and 18-25, the 26-35 suffers more; and between the age groups 26-35 and 56-above, the 56above suffers more human capital obsolescence due to atrophy. However, the interpretation could be either way as the analyses were not set to detect the group that has higher obsolescence than the other, but to establish the difference between groups. Identifying which age group that has higher obsolescence than others could be a cause for a further study.

Finally, this study provides, for the first time, useful specific information on the issues relating to age of workers and obsolescence in the BCI in Nigeria. It also provides a basis for further research. Prior to this study, there has been no documentation of this kind of study. Thus, other scholars can build their research upon the information provided in this study or use this study as a model toward conducting research in a different or similar occupation in the same or another region of the world. The information provided in this study is useful to both the industry, workers, and policy makers because it will lead to the achievement of the 4Rs - *right* people with *right* competency in the *right* job at the *right* time (Sandborn, 2015; 353), in the industry. And thus, has informed the recommendations that: (1) the industry and her workers should intermittently evaluate their skills with the view of finding the specific obsolete skill area and providing training to alleviate the effect of the identified obsolescence in the industry, and (2) the industry creates an incentive like assigning older workers to less arduous occupational activities in order to keep them longer and tap their experience in the industry.

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