Received 2 August 2016
Accepted 12 August 2016

Sustainable human capacity development in the African built environment

How far is the journey to a knowledge society?

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Abstract

Purpose – A growing recognition that human capital is a more critical factor than physical capital in wealth creation has led to the drive for individuals, organisations, industries and societies to become knowledge producing entities. Africa's growing population, high rate of urbanisation and demand for sustainable infrastructure development have highlighted the need for human capacity development (HCD). However, studies indicate that the supply systems for learning which African construction organisations rely on are weak and immature generating wide spread reports of skills shortages, skills mismatches, skill deficiencies and concomitant high unemployment. This paper forms the prologue in a wider research aimed at developing a workforce capability optimising model for construction firms and the purpose of this paper is to review literature relating to HCD to highlight needs and to explore the applicability of emerging workforce development (WD) approaches in project-based construction workplaces.

Design/methodology/approach – Literature review, limited to peer reviewed academic publications in English from 2000 to 2016.

Findings – Much of the literature reviewed focus on educational aspects and consequently basic entry skills into the construction workforce. Workplace learning (WL), though acknowledged, is not given much attention. However, life-long learning, WL and self-directed learning have taken on greater significance because of the transient nature of knowledge in the Knowledge Age. WD practices of construction firms in Africa range from non-existent to average particularly at intermediate skills levels.

Originality/value – The paper makes a case for improved WD systems applicable to the African construction workplace and introduces elements of a proposed capability optimising framework that supports sustained effective learning environments and learners. Significantly, the model will incorporate HCD for intermediate skills and learning at the project level of the organisation.

Keywords Africa, Workforce development, Learning, Workplace learning, Construction industry, Human capacity development

Paper type Literature review

1. Introduction and background

1.1 Overview

The architecture, engineering and construction (AEC) industry is critical to society, the economy and the environment (World Economic Forum (WEF), 2016). The quality of life, for virtually the entire world population, is heavily influenced by the built environment surrounding people (Ofori, 2012; Rwelamila, 2012). Construction currently contributes 6 per cent of global gross domestic product (GDP), 5 per cent of GDP in developed countries and more than 8 per cent of GDP in developing countries (WEF, 2016). The construction industry is considered the largest consumer of resources and raw materials, it generates high proportions of solid waste (40 per cent in the USA),

Smart and Sustainable Built Environment
Vol. 5 No. 3, 2016
pp. 212-231

2046-6099
DOI 10.1108/SASBE-08-2016-0018

accounts for 25-40 per cent of total global energy use, and consequently is responsible for equivalent proportions of carbon emissions. Construction has been described as a "horizontal" industry which (like the financial services industry) serves all other industry verticals in the sense that value creation almost always occurs within or by means of buildings or other construction assets (WEF, 2016). In the same vein, Osabutey *et al.* (2012) note that the performance of the construction industry is essentially linked to national development and prosperity.

Productivity improvement in the AEC industry over the past 50 years has been described as negligible relative to other industries and though new technologies, materials and processes have emerged, the rate of innovation has been very slow and uptake by construction industry practitioners has not been widespread (WEF, 2016). The industry needs to transform, and investment in human capacity is key to any transformation process (Nafukho, 2013). Human capital is now being acknowledged as being more important than physical capital for wealth creation, and Trilling and Hood (2001) note that there has been growing recognition of this fundament since the turn of the century. World Bank (2000) reported that global wealth is concentrated less and less in factories, land, tools, and machinery, whereas the knowledge, skills, and resourcefulness of people are increasingly critical to the world economy.

According to an International Labour Organisation (ILO) (2010) report, the future prosperity of any country depends on the number of persons in employment and how productive they are at work. The report also highlights the various studies that link education, skills, productivity and economic growth as well as findings which suggest that a 1 per cent increase in training days leads to 3 per cent increase in productivity and 16 per cent overall productivity growth is attributable to training. Developing a competent workforce with the requisite knowledge, skills and process abilities is therefore critical to the transformation of the AEC industry. Although this is generally understood by industry practitioners, strategic workforce planning and/or development is rarely a focus of attention for construction organisations (Debrah and Ofori, 2006; Kululanga, 2012; Osabutey *et al.*, 2012; WEF, 2016). The reasons given for the paucity of sustained workforce development (WD) initiatives are centred on construction business being project-based, highly cyclical and highly volatile (WEF, 2016). The construction workforce is therefore considered unstable and any investments in terms of cost and time for training may not have provided commensurate returns by the time workers move to other projects. This reluctance to train may have contributed to the skill shortages experienced in the construction industries of many economies (Awe *et al.*, 2009; Dainty *et al.*, 2007; Wang *et al.*, 2008, 2010).

The unique characteristics of the construction industry may present difficulties for transformation, but are well worth the effort considering that small improvements in performance will impact positively on society, the economy and the environment. Cumulative volume of global construction from 2016 to 2030 is forecast at US$212 trillion (Global Construction Perspectives and Oxford Economics, 2015) and a mere 1 per cent reduction (for instance) in construction costs would save society US$2.1 trillion or an annual average savings of US$140 billion. This potential for high impact has instigated some transformation agenda for the construction industry. For instance, the UK Government partnership with industry in a strategic plan to transform the UK construction industry by 2025 set visionary targets to lower initial and whole life costs of built assets (33 per cent), reduce construction duration and lower emission of green gasses (50 per cent), among others (HM Government, 2013). The report also identified threats which include skills shortages at professional and vocational level and weak

training systems. WEF (2016) commenced a project aimed at guiding and supporting the global engineering and construction industry in its transformation process. Although the report does not set specific targets, it presents a framework for transformation which specifically recognises the need for capacitated people and the challenge the industry faces with an increasing shortage of talented, knowledgeable, highly skilled and innovative workers (vocational, professional and managerial). The report also asserts that construction organisations need to spearhead the capacitation of its workforce through planning and implementing strategic initiatives for WD (WEF, 2016).

1.2 The African construction landscape

This section introduces the trends that currently impact on the volume and complexity of construction activity in Africa and the implications for human capacity development (HCD). Aggregate contribution of construction to the African continent's GDP came to 5.8 per cent in 2014 indicating a steady increase in construction activity from the financial crises years (United Nations Statistics Division, 2016). The African Union Commission (AUC) (2013) reports that the economic growth experienced has not created sufficient jobs particularly for women and youths. High unemployment levels recorded during periods of economic growth are representative of either an unskilled population or skill mismatches in the economy (Kululanga, 2012; ILO, 2013). Either way, sustainable strategies for HCD are critically needed for the success of Africa's development programmes (Nafukho, 2013).

Although progress has been made in recent years, Sub-Saharan Africa remains the lowest region on the United Nations Development Programme's human development index (HDI) with an aggregated HDI of 0.518 relative to a world average of 0.711 (United Nations Development Programme (UNDP), 2015). This gives some idea of the pool from which construction organisations draw their workforce needs. Various reports have identified a critical shortage of skills required for infrastructure development in Africa (AUC, 2013; UNDP, 2015). WEF (2015) report on Africa's strategic infrastructure initiative identified a shortage of technical, engineering, project management, financial and legal skills required to plan and implement infrastructure projects, yet demand for these skills are rapidly increasing. The expected boost in construction activity over the next decade is likely to exacerbate the problem unless HCD programmes are made a priority by the African ACE industry. To better grasp the criticality of the workforce needs for African construction the rest of this section outlines the scope and nature of the expansion in construction activity expected in the short, medium and long term on the continent.

The physical infrastructure deficit in most of Africa has been widely acknowledged and discussed (African Development Bank (AfDB), 2012). However, Africa is emerging as a destination of choice for many investors and development actors as they look for high-growth markets despite the lingering effects of the 2008 financial crisis and recession (Deloitte Team, 2013). Opportunities for investment in the African construction industry have grown significantly and the main drivers are: high population growth; urbanisation, growth of cities and housing; sustainability and environmental pressures; strong growth and resultant shortage of business space; rising middle class and increased consumer spending power; and regional integration and cross-border infrastructure projects (African Development Bank (AfDB), African Union Commission (AUC), and New Partnership for Africa's Development (NEPAD), 2010; African Development Bank (AfDB), 2011; Deloitte Team, 2013; KPMG Team, 2014).

AfDB, AUC, and NEPAD (2010) projects the average annual economic growth rate for African countries at 6 per cent from 2010 to 2040 and this will be driven by a surging population, increasing levels of education and technology absorption. Africa's population hit the one billion mark in 2010 and is projected to grow to 2.5 billion by 2050 (United Nations, 2016). In the last two decades, Africa has experienced high rates of urbanisation at 3.5 per cent annually and this trend is expected to hold up until 2050. In 2010, 35 per cent of Africa's population lived in urban areas and the projections for 2030 and 2050 are 50 and 60 per cent, respectively (Deloitte Team, 2013). Rising urbanisation has put immense pressure on existing infrastructure and housing and has increased the growth of slums (AfDB, 2012). To cope with rising urbanisation, governments are upgrading settlements through integrated infrastructure and services and developing new cities. Though African countries have traditionally not had a mortgage market, this is changing as banks and specialised institutions are introducing new mortgage programmes (AfDB, 2012; Deloitte Team, 2013; KPMG Team, 2014).

The development of infrastructure in Africa has long been recognised as one of the top political and economic priorities for the growth and competitiveness of the continent. The Programme for Infrastructure Development in Africa jointly developed by the AUC, NEPAD and AfDB (WEF, 2015) was designed to support the integration of transport, energy, information communication technology (ICT) and trans-boundary water networks, boost trade, spark growth and create jobs. When implemented it is expected to not only transform the way Africa does its business but also to deliver a well-connected Africa with transnational infrastructure as the physical backbone for regional integration: opening up regional markets; linking production clusters in different countries; facilitating free movement of goods, services and people; and fostering physical stability and peace (AfDB, AUC, and NEPAD, 2010). The expected investment in a variety of large infrastructure in Africa of an estimated US$100 billion annually for the next ten years makes Africa the most popular prospect for close to 50 per cent of the global leaders in the construction and engineering industry (Deloitte Team, 2013; KPMG Team, 2014).

The expected boost in construction activity highlights the challenge of the shortage of the knowledge, skills, capacities and talents, both technical and professional, required to drive the expansive and complex infrastructure and housing projects envisaged during the period. The situation has been described as dire and is attributed to low enrolment in technical courses, emigration (brain drain), lack of access to education and increased demand for skilled labour across sectors (AfDB, AUC and NEPAD, 2010; AfDB, 2011; AUC, 2013; WEF, 2015).

2. Methodology

The African construction industry needs to articulate effective strategies for accelerating capacity development of its workforce to meet the current and future needs. This review paper forms part of a wider research aimed at developing a learning model for the construction workplace that will enable construction firms to develop workforce capability, optimise individual performance and consequently organisational performance. A review of literature relating to HCD in the Knowledge Age is the starting point in the development process.

From this perspective, a high-level search to capture extant publications in HCD and construction workforce development was first conducted to outline previous research in these areas and to identify a set of generic keywords to guide further literature searches (Cronin *et al.*, 2008). The following eight keywords were obtained for the next

level of search: HCD, WD, capacity building, learning, WL, learning organisation, construction industry and built environment. "Developing countries" and "Africa" were added as keywords to provide context. The search strategy involved combinations of the relevant keywords using Boolean "AND" searches in electronic databases available at the University of Central Lancashire LIS Discovery Services. Databases searched included: Academic Journals Complete, ERIC, Business Source Complete, CINHAL Complete, PsycINFO, British Education Index and IEEExplore.

The search was limited to peer reviewed academic articles in English, published between 2000 and 2016 to ensure current research. Over 900 articles were retrieved and their abstracts assessed, therefore the review can be considered comprehensive. In total, 55 articles were selected for the full review based on relevance to the objectives of the research. The searches were complimented with references to other relevant work, author searching, and checking of citation information to expand review backwards and forwards. A complete review covering all the research areas linked to the selected articles is beyond the scope of this paper. Consequently, a critical analysis of the extant literature identified three core themes in line with the specific purpose of the review, these being: the Knowledge Age and its impact on learning; the role and responsibility of construction firms for WD; and WL approaches applicable to construction.

3. HCD in the African construction industry

According to Kululanga (2012) the majority of indigenous construction organisations in developing countries lack capacity and cannot meet construction demand. Also, Osabutey *et al.* (2012) describe capacity development in developing countries as "stunted". The term capacity relates to the abilities, skills, knowledge, learning attitudes, values, relationships, behaviours, motivations, resources and conditions that enable individuals, organisations and systems to carry out functions effectively, efficiently and innovatively in order to achieve their development goals (Kululanga, 2012). According to Horwitz (2013) modern day organisations require people who not only have technical and functional skills but also life skills, emotional intelligence, the ability to adapt to rapidly changing environments, ability to work effectively in project teams, leadership and social skills. Britz *et al.* (2006) argue that because it is the most valuable asset of knowledge societies, Africa needs to invest heavily in its human capital. Capacity development relies to a large extent on learning, acquiring knowledge and adapting behaviour; it also involves unlearning behaviours and practices that are detrimental (Kululanga, 2012). Furthermore, Manuti *et al.* (2015) note that the establishment of knowledge societies emphasise knowledge building and the learning process as strategic factors in individual career development, organisational success and global competitiveness.

3.1 The Knowledge Age and its impact on learning

Knowledge and ideas are currently recognised and accepted as the key resource (Drucker, 1969), the main source of economic growth, and more important than land, labour, money and other tangible resources in the Knowledge Age (New Zealand Council for Educational Research (NZCER), 2014; World Bank, 2000). Demir *et al.* (2015) define knowledge as an "intellectual product" or "something learned" that is acquired by thinking, judging, reasoning, reading, observing, and testing. Similarly, Davenport and Prusak (1998) define knowledge as a fluid mix of framed experience, values, contextual information, and expert insight that provides a framework for evaluating

and incorporating new experiences and information – it originates and is applied in the minds of knowers. These definitions imply that knowledge is the product of human intellectual activity and also the input for intellectual processing. With each information processing cycle new knowledge is created by the human mind. In this process of knowledge development there are two assets, people (creative beings) and information. In this sense society constitutes a factory for new knowledge (United Nations, 2005). In this regard, the twofold challenge for the construction industry in establishing knowledge societies is to sustain the development of creative people and to provide channels for information flow. It has been noted that where ICT is deployed in information production, diffusion and utilisation, massive amounts of new meaning, knowledge, ideas, and innovation are generated (Oblinger, 2012; United Nations, 2005). This process of generating new knowledge has grown in efficiency in the past few decades and has accelerated to the point where knowledge tends towards transience (Toffler, 1970). Manuti *et al.* (2015) record that skills and competencies in the workplace become rapidly outdated in these fast paced contexts. Furthermore, Powell and Snellman (2004) define a knowledge economy as "production and services based on knowledge-intensive activities that contribute to an accelerated pace of technical and scientific advancement, as well as rapid obsolescence". The nature of knowledge has changed from the behaviourists' foundations of its being distinct and abstract (Hung, 2001) to its being like some form of energy, dynamic and able to do things or make things happen (NZCER, 2014). Understanding this dynamic characteristic of knowledge is key to articulating the means for acquiring it (learning) in the Knowledge Age. Given the exponential expansion of knowledge, its transience and accessibility, it may no longer be viable for educational institutions to input all the knowledge required for working life into students during the school years. Life-long learning and the individual's ability to learn continuously have therefore taken on greater significance. An integration of the learning of industry specific abilities with the abilities and resources required for effective, efficient and continuous learning both in school and in the workplace are required.

Britz *et al.* (2006) synthesised from literature a definition of a knowledge society that is all encompassing:

> A society that operates within the paradigm of the economics of information. It values human capital as the prime input to production and innovation. A knowledge society is well connected to the dematerialised economy, and has access to relevant and usable information. A highly sophisticated physical infrastructure underpins this economic model and allows the delivery of the material objects that are accessed and manipulated in the dematerialised world of modern ICT.

To become a knowledge society, a group needs to meet four interrelated criteria: ICTs and connectivity; usable content (knowledge, i.e. affordable, available, timely, relevant and readily assimilated); infrastructure and deliverability; and human capital (Britz *et al.*, 2006).

Germane to this discourse is the concept of shared spaces for knowledge generation also known as creative networks which are described as the foundation for the creation of individual or collective knowledge (United Nations, 2005). These spaces could be physical, virtual or mental or any combination of them and they could also function at individual, organisational, industry or societal level. The shared spaces are characterised by participants who share time and space and transcend their own limited perspectives or boundaries. Participants are from multi-disciplines, possess multi-viewpoint dialogues,

have equal access and maximum capability with minimum conflict (United Nations, 2005). This concept aligns with the mode of knowledge generation in the built environment which is categorised as "applied practice-oriented knowledge production" and involves multi-disciplinary teams' inclination to innovate by trying to bring new approaches to bear on intractable problems within the field, or to develop more effective ways of dealing with routine issues (Griffith, 2004). This suggests that the construction site constitutes a shared space for knowledge generation.

Learning theories underpin the methods of learning and teaching in most subject areas (Pugsley, 2011). Modern thinking about learning has moved away from the dialectic of behaviourism and cognitivism to more holistic, multidimensional and integrated views about learning. Cognitive, constructivist and humanist views integrate within a holist approach that views a person as a whole. The emerging field of the learning sciences is one that is interdisciplinary, draws on multiple theoretical perspectives to build understanding of the nature and conditions of learning and development within context (Barab *et al.*, 2004). Context for learning has moved beyond "school" to encompass the home and the workplace (Davis and Hase, 2001; Eraut, 2004; Manuti *et al.*, 2015; Vaughan, 2008). Connectivism (Siemens, 2004) is a contemporary learning theory that aims to explain learning in the digital age.

The underlying principles of Connectivism are that learning is a process of connecting information sources and that capacity to know more is more critical than what is known. Knowledge is no longer acquired in a linear manner because chaos, complexity, and the increased interconnections in differing fields of knowledge create an ever-shifting reality. Knowledge, information and learning now reside in diverse opinions and also in non-human appliances. The process of learning therefore involves making the connections between the diverse sources of knowledge, choosing what to learn to solve the current problem by drawing distinctions between important and unimportant information, and being able to detect patterns in the information and to recognise when new information alters the landscape on which the decisions of yesterday were made (Siemens, 2004; Steffens, 2015).

The United Nations (2005) index of knowledge society (IKS) rates member countries for knowledge assets (educated people and media for information flow), advancement (human and informational resources) and foresightedness (minimising the impact of negative externalities) and the indicators for most African countries are on the low level. From a reality check of African countries with respect to the requisite criteria, Britz *et al.* (2006) concluded that Africa has a long way to go in transforming into a knowledge society but that the potentials were evident. Knowledge societies are not only about technological innovations but also about human beings, their personal growth and individual creativity, experience and participation (United Nations, 2005). The development of this personal aspect of human capability should therefore not be ignored. Two significant considerations in effective HCD are first that learning has no end-point but is a life-long process, and second, the ability to learn involves more than the cognitive but also has social and emotional dimensions (Billet, 2004; Blunden, 2006; Bruner, 2009; Goleman, 1998; Hager, 2004; Illeris, 2002, 2007; Jarvis *et al.*, 2003; Kolb, 1984; Vaughan, 2008). Poortman *et al.* (2011) present qualitative case studies whose findings indicate that WL is a result of a process taking place in three dimensions: the interaction (social); incentive (emotional); and the content (cognitive) dimensions. These factors should be identified and adequately considered in the design of learning environments in each context. A pre- post-test with control group research design to assess the whole person approach to skill learning found that although teaching

executive skills using a whole person experiential pedagogy approach takes substantial energy, the results were significant and well worth the increased effort (Hoover *et al.*, 2010).

In summary, HCD in the Knowledge Age involves creating environments or spaces where knowledge can be accessed, processed and utilised and where the generation and sharing of new knowledge is enabled and supported. It also involves a whole person approach to the development of the individual capabilities for learning continuously, a requirement for HCD in the Knowledge Age. Learning by this definition relies on a different set of human capabilities than those traditionally developed in educational institutions. The skill set for workers has expanded to include: the abilities to locate, assess and represent knowledge; ability to communicate knowledge to others; ability to work productively in collaboration with other people; the abilities to learn, unlearn and relearn; adaptability; creativity; innovative skills; self-awareness; and most importantly, self-directed learning abilities (Toffler, 1970; Kostos, 2006; NZCER, 2014). These suggest that new learning paradigms both at school and beyond school may be required (Kostos, 2006).

3.2 The roles and responsibilities for construction learning

Capability building is a very broad concept and can be managed in multiple ways (Nafukho, 2013) with contributions at institutional, organisational, project, team/crew/work group and individual levels. The ILO (2010) reports that developing a skilled workforce for strong, sustainable and balanced growth is understood in broad terms to cover the full sequence of life stages: basic education which provides the foundation for individual development; initial training to provide the individual with core work skills, knowledge and industry-based professional competencies; and continuous workplace and life-long learning to maintain individuals' skills and competencies as work, technology and skill requirements change.

Construction firms are traditionally reluctant to train and develop employees despite evidence of the benefits and contribution to individual and corporate performance (Dainty *et al.*, 2007; Osabutey *et al.*, 2012; Wang *et al.*, 2010). Horwitz (2013) considers private enterprise training vital to support and sustain the improved levels of skills required for infrastructure projects. Manuti *et al.* (2015) report that the workplace has become a site for learning for two different purposes: development of the enterprise and the development of individuals' capacity. Kululanga (2012) on the other hand argues for an alignment between the changing requirements of industry and the educational curricula to allow education and training providers to remain the main suppliers of construction skills while HCD initiatives at organisational level be limited to recruitment, adopting a culture of improvement, partnerships in research and sharing best-practices with other organisations.

However, Africa's institutions may be ill-equipped to fully cope with the rapid rates of new knowledge generation and innovation (AfDB, AUC, and NEPAD, 2010). For instance, Yassa (2014) identified a skills mismatch in the Egypt construction industry with attendant lengthy school-to-work transitional periods, sluggish job creation cycles and graduate unemployment (34.9 per cent in 2007). Yassa (2014) therefore suggested an integration of the education system with workplace capacity development initiatives. Studies in the South African construction industry report similar results in the areas of property development graduates (Othman, 2014), construction project management education programmes (Rwelamila, 2007), and artisans, supervisors and skilled instructors (Hall and Sandelands, 2009). In Zambia Muya *et al.* (2006) found poor

quality and shortage of construction craft skills and suggest that as the development agenda for Sub-Sahara Africa gains momentum, attention needs to re-focus on effective and sustainable human resource development (HRD) strategies for the construction sector in the region. Various studies have highlighted deficiencies in the knowledge and skills of construction graduates in Nigeria with industry calling for more frequent curriculum reviews to ensure alignment with market/industry demands (Ameh and Odusami, 2014; Adindu and Ofoegbu, 2014). Given the pace of knowledge generation and speed of diffusion, curriculum reviews may not be able to keep pace and construction firms must device mechanisms for continuous WD.

The situation with intermediate construction skills (artisans, supervisors, instructors) is peculiar because in developing countries, construction firms draw most of their construction labour from informally trained groups and studies have shown that a major part of this segment of the workforce do not cope well with the pace of technology, material and method changes, thus leading to low productivity and poor quality workmanship (Awe *et al.*, 2009; Kikwasi, 2011). In Tanzania, 50 per cent of construction labour have no schooling or formal training, 2 per cent went through an apprenticeship, 23 per cent through technical schools, and 8 per cent through construction organisations (Kikwasi, 2011). Institutional contributions to HCD are inadequate in meeting the requirements of industry and construction firms need to complement with WD initiatives at all levels.

Moreover, organisations are better placed to forecast their own workforce needs and can therefore organise for the provision of needed skills through various mechanisms thereby aligning skills supply with demand in real time (WEF, 2016). Skills development for the construction industry invariably involves a practical element that is best learned in context. This is strongly supported by educational learning theories such as WL, situated learning and communities of practice (Eraut, 2004; Lave, 1991). Learning is therefore no longer about merely producing knowledge, competence, skill and expertise in individuals as static products but is a continuous process of human development (Hager, 2004) that really has no limits because what is fact today may be false tomorrow and what is skill or expertise now may not be required by the workplace in the immediate future, an ever-shifting reality (Siemens, 2004).

3.3 Approaches to construction workplace learning

Organisations need to plan strategically for WD to meet current and future requirements, taking a long-term view and planning to the granular level of skill clusters (WEF, 2016). Hall and Sandelands (2009) describe the WD system for a South Africa construction firm which maintains a core of highly skilled artisans who lead crews on projects. Artisans are recruited to augment the core crew leaders while labour local to the project location are recruited and upskilled on-the-job. Where required skills are unavailable, they are imported from other countries. The firm provides learnerships and advanced artisan training to upskill workers with some prior learning and/or experience. The labour mix is expected to effectively deliver current projects while continuous development on-the-job is expected to provide required skills in the future. This traditional model for meeting workforce requirements employed by construction firms across Africa and even globally is designed to meet short-term workforce needs on project-by-project basis and therefore does not appear to provide for long-term development, continuous improvement and innovation. Organisations need to move away from the traditional cycle of needs assessments and immediate supply processes to see the value in more holistic, multidimensional and longer term solutions (Kelly and Palmucci, 2014).

Shaping the future of the workfare commences with strategic workforce planning then smart hiring and enhanced workforce retention strategies. One identified cause of the inability of to attract and retain young talented people is the poor image the industry has as an employer. Construction work is physical, carried out under uncomfortable and unsafe environments (the 3Ds – dirty, difficult and dangerous), low wage regimes, job insecurity, and lack of career progression paths (Hall and Sandelands, 2009; Kikwasi, 2011; WEF, 2016). To counter this, construction organisations individually and collaboratively need to confront the image problem with a robust campaign to promote the industry as the "preferred employer" by improving wages comparable to other sectors, offering opportunities for career progression, training, role models, greater diffusion of technology, marketing strategies that focus on specific groups such as women and young people (Hall and Sandelands, 2009; WEF, 2016). Horwitz (2013) found that organisations tend to have strategies for attracting needed skills without concomitant strategies for retaining them and suggests firm-level strategies which include: developing a WL culture; providing skills development opportunities; allowing flexible employment practices; developing a reward and benefit system; ensuring employment equity; implementing effective talent management schemes; and possibly re-employing older, retired highly skilled and experienced people in training, mentoring and coaching roles.

Continuous learning in the workplace has been established as a means for continuously increasing workforce capability, improving workforce retention and optimising organisational performance, however efforts need to be continually aligned with business strategy (Abdel-Wahab *et al.*, 2008; WEF, 2016). WL offers rich development opportunities and multiple approaches which should integrate informal (coaching, mentoring; problem solving; hypothesis testing; job shadowing) with formal (classroom-like training) methods (Manuti *et al.*, 2015; WEF, 2016). Learning design should also exploit technology by adopting, e-Learning, simulation-based training and automated tracking of learning (WEF, 2016). WD must include all staff and learning programmes should therefore customise offerings to different target groups construction workers, functional experts, senior management and in addition, take into consideration the different needs of diverse generational groupings (traditionalists, baby boomers, generation X and millennials) (Manuti *et al.*, 2015; WEF, 2016; Yassa, 2014).

According to Ofori (2012) African construction firms have a low market share of costly and complex projects and need to improve and develop capacities in these areas by benefiting from the presence of foreign construction firms for transference of technology and knowledge. This potentially fosters innovation and improves performance (Werna, 2012). Hawkins (2012) suggests including social development opportunities during the procurement of construction projects such that HCD, for instance, simply becomes a project objective allowing potential suppliers to develop a methodology for such programmes and to price them accordingly. This agrees with Ofori's (2012) position that ample incentives may need to be applied to leverage learning from the experience of foreign construction firms on African projects. In the oil and gas sector the process is commonly recognised as "local content". Hawkins (2012) argues that despite the challenges, this represents a major opportunity for the African construction sector to create opportunities to build the capacities of professionals, contractors, employees and the supply chain as exemplified by its successful use in America (e.g. Buy America Initiative), Britain, India and Indonesia (Hawkins, 2012).

An important component of WD in any organisation is an effective knowledge management system which allows for the capture, organisation, storage, accessibility,

diffusion, and utilisation of knowledge usually leveraging on ICT (WEF, 2016). The construction industry lags behind other sectors in the harnessing of ICT for performance improvement (Varghese, 2012). Oladapo (2007) study on ICT usage in the Nigerian construction indicated that its use was rudimentary and limited to basic processes relative to developed countries. Varghese (2012) suggests that a cultural shift is required to move the construction sectors in emerging countries from traditional practice to full-fledged industries with a culture of sharing information and learning from mistakes and successes. Knowledge sharing and knowledge management can be greatly enhanced using ICT-based platforms from simple media such as websites, videos and case studies to sophisticated databases with indexed representations and categorised searches which are more effective for focussed decision support. To this end, some leading global construction groups have invested in systems that capture and code best practices and lessons learned and also developed ontology and query mechanisms for project-based knowledge (Varghese, 2012). Also, building information modelling for instance has the potential for significantly reducing construction costs and durations; and for knowledge storage and diffusion (HM Government, 2013; WEF, 2016).

Kululanga (2012) prescribes greater collaboration between construction organisations, and sharing of best practices but also highlights the fact that such relationships rare and that the adversarial relationships associated with this problem are greater in developing countries. Emuze and Smallwood (2014) agree that knowledge sharing is possible among construction partners working collaboratively in a supply chain and could improve performance and promote innovation in construction. Yassa (2014) suggests the formation of sectoral knowledge repositories to be linked across the continent by an "African Learning Network" to streamline knowledge sharing. Ayoo and Lubega (2014) propose regional knowledge sharing networks among of national research and education networks within the region. Lee and Crawford (2014) argue that integrating disciplinary knowledge from various perspectives is of value in solving complex problems in the twenty-first century built environment and therefore suggests shared knowledge bases, interdisciplinary learning environments and creative networks.

Carrim and Basson (2013) opine that learning within organisations is a multilevel process at organisational, group and individual levels. Organisational support in providing a learning environment, culture and resources and also in providing rewards to incentivise group performance is important (Carrim and Basson, 2013). Best practices for learning include the use of workgroups (teams, crews) to balance skill sets and the breaking down of functional silos by using job rotation (WEF, 2016). Successful learning at group level depends on willingness of members to share information and to integrate their individual capabilities in generating and utilising knowledge. The willingness to learn and to become involved in learning requires individual commitment without which, learning will not take place no matter the strategies put in place by management (Carrim and Basson, 2013). Nafukho (2013) highlights the importance of individual choice in capacity development holding that planned development is most likely to fail where individual choice is lacking. Ahmad *et al.* (2015) found that capacity building of employees enhances their performance only when the career development of the employee is also enhanced.

Carrim and Basson (2013) note that organisational cultures are pivotal contributors to corporate learning as they shape values, beliefs and work systems that either enhance or obstruct knowledge acquisition and learning. An organisation therefore needs to build a culture of trust, communication, openness and innovation where opportunities for learning are provided and learning is supported by adequate

learning resources. Learning resources include knowledge sources and knowledge tools made easily accessible to workers at all levels and locations and availability of training instructors, coaches, mentors and learning facilitators (Du Plessis *et al.*, 1999). Toyota believes that performance is driven by people not systems and that learning must occur on the job every day and must involve everybody, therefore, the organisation's design must support WL (Balle and Handlinger, 2012). Learning environments have been successfully developed and maintained in the automotive industry. For instance, Dankbaar (1999) reports that Rover and Ford have installed "open learning centres" in some of their manufacturing plants featuring individual work stations where workers can undertake computerised training programmes combining audio, video and text. Citroën and Peugeot also provide distance learning modules in topics such as diesel technology, electricity and accounting. Raiden and Dainty (2006) present the result of a case study which suggests that construction organisations in the UK adopt sophisticated HRD practices albeit unintentionally rather than as targeted strategic policy. Julius Berger (engineering construction) in Nigeria provides mobile training centres at some of its construction sites. Construction firms such as Arup (global engineering design and consultancy) and Transnet (rail, ports and pipeline infrastructure) in South Africa have well-developed WD systems and these need to become more widespread in the African AEC industry (WEF, 2015, 2016).

4. Discussion

Human capacity is currently recognised as the most important factor in wealth creation and the knowledge and ideas of people are the main resource for economic growth. Construction activity is on the increase in Africa and is expected to expand in the next one or even two decades. Reports suggest that the African construction industry severely lacks the capacity to cope with the quantum and complexity of expected construction activity. With regard to human capacity, studies were presented that indicate that the supply systems for learning that African construction organisations rely on are weak and immature leading to wide spread reports of skills shortages, skills mismatches and skill deficiencies with attendant high unemployment rates. The low ratings of African countries on the UN generated multidimensional indicators of human development and knowledge society indexes highlight the long way that most African countries have to go to become knowledge societies. Considering that African construction draws on this pool of low human capacities and inadequate knowledge to function, modern construction organisations need to focus on creating environments and workplace cultures that encourage continuous learning, knowledge generation, knowledge diffusion and innovation.

Capability building is a broad concept and requires contributions from education and organisations. It covers the full sequence of life stages from school through to the workplace with continuous workplace and life-long learning to not only adapt to changes in work, technology and knowledge changes but also to enable the individual participate in knowledge generation and innovation. Knowledge generation continues to expand at an enormous rate and its rate of diffusion has been multiplied and made more cost efficient by ICT to the extent that knowledge has acquired the quality of transience. Information has become ubiquitous and is easily accessed while knowledge generation and innovation have become key to gaining the competitive edge. Given these, educational institutions can no longer be expected to deliver all the required working life skills into their graduates while at school. Consequently, life-long learning,

WL and self-directed learning have taken on greater significance. An individual's capacity to know more has become more important than what is currently known.

Contributions to learning at organisational, project, team/crew/work group and individual level are essential within construction firms. At organisational level, WD practices that emerge from literature are: strategic workforce planning; aligning human resource strategies with organisational business objectives; building a learning environment with a culture for learning, knowledge sharing and continuous improvement; and supporting learning with knowledge resources and tools. Also, information/knowledge capture and storage in searchable repositories can be facilitated by digital technologies. Diffusion of knowledge is also achieved through digital media, computers, tablets, smartphones, and social media networks. The challenge may simply be that of changing mindsets.

Literature generally recognises learning at organisation, group and individual levels. This paper argues that due to the project-based nature of construction, the integration of learning at project levels is important. This is because it is at these levels that the productivity of a construction organisation is tested. Every other activity of the organisation exists to support the successful completion of the project and the highest proportion of the workforce is engaged in work at the project level. WD practice at the project level can be achieved through on-the-job learning methods such as coaching, mentoring, observing, imitating, real-life problem solving, hypothesis testing, and job shadowing. These can be complemented with off-the-job learning in partnership with external leaning providers such as education, training, other construction firms, and equipment and material suppliers. Self-directed learning also provides a viable contribution to learning at this level where knowledge sources are provided close to work locations. Figure 1 describes the aligning of the learning that underpins performance to business goals.

Figure 1.
Managing and aligning learning with business goals

WD plans for individual workers need to be jointly agreed between HR and the individual worker by balancing the organisation's future skills requirements with the individual's career choice and progression route. This gives the worker the motivation to learn and also a sense of value, purpose and ownership within the organisation. This paper argues that properly implemented a win-win result is achieved with a purposeful, driven and satisfied workforce continuously learning and improving towards achieving the organisation's business goals with the promise of innovation.

In building a learning environment it may be helpful to draw on an analogy from the highly developed learning culture within the teaching hospital environment. Consider the scenario of the practical training of doctors in sometimes chaotic emergency situations with students always around to learn from more experienced doctors, nurses and other medical practitioners in multi-disciplined teaching hospital environments with live patients. A learning culture has come to pervade teaching hospitals such that consultants are always expected to teach, explain, share knowledge, share experience, discuss, answer questions at all times no matter the emergency or frenetic pace of work. The student doctors, interns, registrars quickly learn to take notes, attend mandatory lectures between practical assignments, complete rotations, and study (self-directed learning). Copious records are kept of patient assessments, tests, diagnoses, treatments and progression to recovery or otherwise. Where treatment fails audits are carried out to determine cause and alternative treatment options are considered, novel ideas are proposed, researched, discussed and tried out. New technologies are adapted for medical purposes on a regular basis (laser, magnetic fields, radio waves, electric field gradients, augmented reality, robotics, etc.). All the information generated is put together in a repository of knowledge from which new knowledge is generated and shared leading to continuous improvement and innovation. As the learners are drawn into the communities of practice they grow in knowledge, skill, capability and expertise. In addition, they develop identities within the group, gain recognition and imbibe the culture. This paper suggests that similar learning environments can be created within construction organisations and on construction sites.

This paper forms part of a wider research which is aimed at developing a skills learning model which will enable construction organisations optimise individual worker performance and ultimately organisational performance by building an enabling learning environment and adopting a whole person learning approach. Figure 2 outlines the core elements of the proposed model and these are integrated within a capability maturity model which is being developed within selected construction firms in Nigeria to provide a structured approach for sustainable WD.

5. Conclusion

This paper presented a review of literature pertinent to the development of a framework for the continuous improvement of human resource capabilities within the context of construction firms in Africa. As background to the review, the scope of construction activity on the continent in terms of current and forecast growth rates were explored to determine the extent to which WD and learning systems in place can meet the needs of industry in the short and long term. Knowledge generation and diffusion systems have so increased in efficiency that knowledge has become almost transient. Theories of learning in the knowledge and digital age such as Connectivism therefore consider an individual's capabilities to learn more are more important than the quantum or quality of what an individual already knows. It is evident that the education system in Africa cannot provide construction organisations with all the

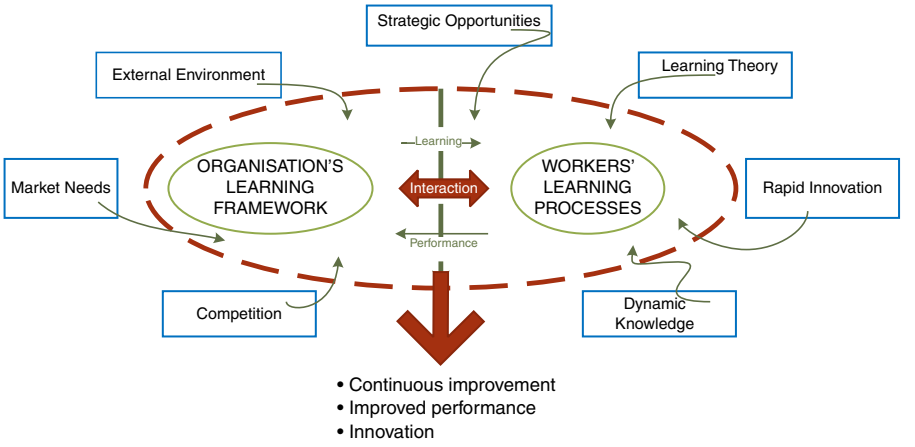

Figure 2.
Learning and performance optimisation solution for construction firms

capabilities needed to cope with the envisaged expansive and complex construction projects. To develop and maintain a capacitated workforce, construction organisations must therefore continuously update and must re-tool their workforce in a strategic and sustained manner.

Although construction organisations are not traditional learning institutions, they are still rich sources of a wide variety of knowledge. Where relevant and current knowledge from within and from outside the organisation is made accessible to workers at all levels and the human capability to process, utilise and produce new knowledge is developed and activated, the potentials for individual and therefore corporate performance optimisation may be greatly improved. Further work on this research project involves the design of a structured approach to continuous WD for construction organisations which integrates learning at individual, project and organisational levels within a capability development framework focussed on optimising performance.

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