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Review

Towards accident-free construction sites: The role of human resource management – A review

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Rural-urban migration has put a lot of pressure on governments and private sector actors to provide decent infrastructure in many developing parts of the world. Buildings for example, are hastily put up to meet ever growing demand for housing and in so doing raise the risk of accidents at construction sites. The occurrence and widely publicized construction site accidents has attracted a lot of international and local concern. Although the challenges are multi-faceted, the role of Human Resource Management (HRM) play a pivotal role in this dynamic industry. As such, the aim of this paper is to review construction accidents with a bias towards better HRM to reduce them in the industry. It can be concluded that proactive HRM in the form of Tier II Workforce Management Strategy significantly solves the construction site accident problems.

Keywords: Construction accident, construction industry, human resource management.

INTRODUCTION

The construction industry is one key sector in the economic growth of both developed and developing economies. Advancement in commerce, transport, communication, and education is inevitably affected by the level of national construction industry progress. There is “a highly positive correlation between the growth in construction sector and the overall growth measuring in terms of gross domestic product or GDP” (Kokkaew and Koompai, 2012). This relationship is reported in research carried out in developed economies (CITB, 2002; Loosemore *et al.,* 2003), emerging economies (Kokkaew and Koompai, 2012; Gürcanli, 2009) and developing economies (Jimoh *et al.*, 2017; Ogiriki *et al.*, 2017; Basheka and Tumutegyereize, 2013; Okpala and Aniekwu, 1988). According to Loosemore *et al.* (2003), construction industry also plays a significant contribution to the world gross GDP. This is easily explained by the fact that major sectors such as chemical process, food processing, manufacturing, petrochemical, and power generation and transmission are all part of industrial construction (Brandenburg, 2006).

The construction industry research has seen global interest. The interest is largely attributed to the challenges, potential opportunities, and the import of this industry. Construction industry research has been carried out in many countries including but not limited to; US (Chini and Valdez, 2003; Derr *et al.*, 2001; Arditi and Mochtar, 2000), UK (McCabe, 2007; Murray and Langford, 2003; Construction Industry Task Force, 1998), Spain (López *et al.*, 2008), New Zealand (Tran and Tookey, 2011), Australia (Richardson, 2014), Turkey (Ugur and Gürcanli, 2005; Gürcanli, 2009), Thailand (Kokkaew and Koompai, 2012; Aksorn and Hadikusumok, 2008), India (Thomas and Sudhakumar, 2014), Kuwait (Kartam *et al.*, 2000), Trinidad and Tobago (Hickson and Ellis, 2014), Nigeria (Jimoh *et al.*, 2017; Nkem, 2015), and Uganda (Alinaitwe, 2006). Construction industry research has also been done at international level (Du *et al.*, 2007). Notwithstanding, the construction industry faces several challenges (Ogunde *et*

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al., 2017; Lubega *et al*., 2000). High frequency of accident occurrence and poor nature of Human Resource Management are two serious challenges in the industry. The rate of accidents in the construction sector is unacceptably high both in developing as well as developed economies. Risk of a fatality in the construction industry is five times more likely than in a manufacturing based industry, while it is two and a half times higher in cases of major injury (Maraqa and Mohamed, 2013; CIDC, 2006; Davis and Tomasin, 1990). According to International Labor Organization, as cited by Aneziris *et al.* (2012), construction sector contributes about 17% to total world workplace fatalities.

In addition to human cost of suffering, the economic effect of an accident can be devastating (Mthalane *et al.*, 2008; Sawacha *et al*., 1999). Many labor days and hours are lost due to injuries leading to an absence from work. By 2001 in Europe, annual direct insurance costs of workplace accidents alone was estimated to be €20 billion and 149 million working days were lost (Konkolewsky, 2001). In their research Haslam *et al*. (2005) found that problems arising from workers or the work team and work place issues contributed to 70% and 49% of construction accidents respectively. Inadequacy of safety provisions often make individual workers prone to accidents (Charehzehi and Ahankoob, 2012; Lubega *et al.*, 2000; Carasco, 1993). These factors are all related to Human Resource Management (HRM) and thus indicate that more studies should be done to understand the cause-effect relationship between HRM and construction accidents.

Dainty and Loosemore (2012) defined HRM as the way people are employed and managed. People management practices remains poorly understood in the construction industry (Dainty and Loosemore, 2012). Management of people within the construction sector has been labeled as complex and problematic given that the applicability of much mainstream human resource management (HRM) theory to this industry is limited (Dainty and Loosemore, 2012). Human resource management in the construction industry is not widely researched and unfortunately the known strategic human resource management has little application in the construction industry either (Brandenburg, 2006).

In other industries the implementation of strategic HRM practices with other business strategies have been associated with reduced employee turnover (Van Dierendonck *et al.*, 2016; Hashim *et al.*, 2016;Sheppeck and Militello, 2000; Arthur 1994), and higher productivity (Wright et al., 1996). But in construction firms HRM has typically been an emergent rather than a strategic or deliberate process (Brandenburg, 2006) with HRM activities often regarded as marginal activities (Dainty and Loosemore, 2012). This is rather unexpected given that construction labor form 7.5% of the world labor force (Kulkarni, 2007) and is one of the most people-reliant industrial sectors (Dainty *et al.*, 2007). HRM has been previously labeled a vital factor to the aspiration of long-term improvement for the construction industry (Kilby and McCabe, 2008; Construction Industry Task Force, 1998) and there is a strong connection between HRM performance and project performance (Dainty and Loosemore, 2012). This is because proper use of human resource management brings about an optimum utilization of other resources (Raheem and Bankole, 2014).

Construction industry accidents have significant ongoing cost to employers, workers and society (Haslam *et al*., 2005). Construction accidents are unplanned for costs and in addition to human costs involved it may lead to bad publicity that could even make a company uncompetitive in the industry (Asanka and Ranasinghe, 2016). Many have said that effective use of HRM can increase the competitive advantage and help improve the overall performance of construction industry (Paauwe, 2004; Paauwe and Boselie, 2003) currently characterized as a labor-intensive and low-tech sector (Kokkaew and Koompai, 2012). It is time the construction industry wakes up and solves the HRM problem that potentially will (as discussed later in this paper) significantly address accidents in the industry. There is still a gap in literature to examine the connection between construction HRM and construction accidents. This paper reviews independent literatures on construction accidents with a bias towards better construction HRM. The special aim of this paper is to fill the knowledge gap in the understanding of how effective HRM can be used to minimize construction accidents and hence improve the construction industry especially in developing countries like Uganda.

Sections of the review paper

The paper is organized as follows: section 3 is a detailed review of accidents in construction industry. It discusses construction accident global situation and also the factors that lead to immediate accident circumstances. Section 4 reviews HRM in construction industry and expounds on HRM practices, policies and processes in the construction industry. Section 5 discusses the connection between construction HRM and construction accidents. Connections of HRM practices, policies and processes with accidents are discussed separately into detail and suggestions are made on how each can be aligned to ensure minimization of accidents at construction sites.

Accidents in the construction industry

The construction industry is very hazardous worldwide, because of the “unique dynamic nature, poor conditions and tough environment” (Aneziris *et al*., 2012). The industry is often characterized as very diverse, complex and risky (Fang *et al.*, 2015; Kokkaew and Koompai,

2012). In 2003, 60,000 fatalities out of a world total of 355,000 workplace deaths, (nearly 17%), were reported in construction section (Aneziris *et al*., 2012). Construction accounted for 31% of all deaths when collated with all other UK industries in the year 2002/03 (Haslam *et al.*, 2005). A statistical portrait released in 2010 by the European Union showed that in 2007 about 4.8% of construction workers in the EU-27 reported having experienced at least one or more accidental injuries at work or in the course of work (Silva and Šteinbuka, 2010). In 2007 the U.S. construction industry experienced more fatalities than any other industry in the private sector (BLS, 2007). Japan also reported in 2008 that out of 1,268 fatal workplace injuries, nearly 34% (430 cases) were from construction sector (Toyosawa and Katsutoshi, 2011), while in India the likelihood to be injured is 16.5% for any of the four million construction workers (Goswami and Rana, 2011). However the situation looks more alarming given that these published statistics seems to be the tip of an iceberg. In some countries like the UK injuries reported by employers have been stated to be as low as 40% (HSC, 2003).

Fall from height contributes to majority of construction fatalities (Goswami and Rana, 2011). Haslam *et al*. (2005) said that in 2002/03 fall from height contributed as high as 46% of construction accidents followed by struck by a moving vehicle 15%. In order to solve the construction accident problem the root causes for it must be identified and analyzed. Factors such as failure to ensure safe systems of work, poor maintenance of equipment, use of defective materials, and poor supervision and training have been identified as causes for fatal accidents in Great Britain HSE (1988; 1978). Other workplace risks that have been reported to lead to accidents include time pressure, long/irregular hours, poor communication, job insecurity, and discrimination (HSE, 2016). Research shows that Headquarter/managerial, site, and individual factors contribute to accidents in approximate ratio of 1:2:1 respectively (Gibb, 2014; Whittington *et al.*, 1992) and unsafe behaviour is the root cause of accidents at construction sites (Whittington *et al.*, 1992). This is similar to other researchers' work that has revealed that individual factors contribute to about 70% level (Haslam *et al*., 2005) and in some cases up to about 80% level (Rasmussen, 1997) to accident causation. Haslam *et al.* (2005) believes that in addition to those factors mentioned above, project design also contributes to accident causation. Project phase and project progress compared to schedule affect performance expectation from management and hence can lead to dangerous undertakings resulting into accidents.

Construction accidents do not occur haphazardly. There seems to be a model of causal influences that lead to immediate accident situations. A model for hierarchy of causal influences in construction accidents was developed by Haslam *et al*. (2005). It describes how accidents arise from a failure in the interaction between the work team, workplace, equipment and materials, giving rise to the 'immediate accident circumstances'. Accident causation starts from distal 'originating influences' such as permanent works design, project management, construction processes, safety culture, risk management, client requirements, economic climate and education provision. These factors influence the development of accident 'shaping factors' of workers, sites and material/equipment that affect the operation of workers, sites and material/equipment. The attitudes, motivations, knowledge, skills, supervision, health and fatigue affect the actions, behavior, capabilities and communication of the work team that may lead in to accident. Site constraints, work scheduling and housekeeping of the workplace shape the site layout, noise, lighting, space, temperature and local hazards that may lead to accidents. Similarly, the suitability, usability, condition and, therefore, safety of materials and equipment depend on their design, specification and supply/availability.

There is a poor safety culture in the construction industry that promotes or fails to inhibit 'unsafe behavior' among the construction workers leading to site accidents (Agwu and Olele, 2014; Dester and Blockley, 1995). The three major reasons given for construction workers engaging in unsafe acts, as pointed out by Haslam *et al*. (2005), are; (1) overlooking safety in the context of heavy workloads and other priorities, (2) taking shortcuts to save effort and time, (3) inaccurate perception of risks, with the feelings of invulnerability and 'it won't happen to me'. It is clear that underlying all of these is inadequate safety knowledge. Pointing to deficiencies in safety training among the construction workers. Safety knowledge is also needing among construction supervisors at global level (Fang *et al.*, 2015). Great Britain is doing relatively well at international construction accident levels but interviews among construction supervisors revealed that they frequently have little safety awareness and poor understanding of accident causation and prevention (Haslam *et al*., 2005).

The diversity, complexity and risky nature of the industry makes it less attractive for young people to enter into the construction workforce. This aggravates the problem of lack of skilled workers (Kokkaew and Koompai, 2012; Tressell, 1914/1957). To maximize effectiveness of human resource management in the heavily people-reliant construction industry, Kokkaew and Koompai (2012) suggested that there should be consideration of safety and health. Essentially, human factors are involved in most safety failures thus the need for proper understanding of the HRM in the construction section.

HRM in the construction industry

Raheem and Bankole (2014) defined Human Resource Management (HRM) as "the planning, organizing,

directing and controlling of the recruitment, compensation, integration, sustenance, and separation of man power resources to an end best suited to the achievement of organization, and individual objectives." Construction human resource is therefore the managerial and technical workforce required for construction (Raheem and Bankole, 2014). In order to effectively manage the human resource, HRM utilizes different practices, policies, and processes depending on the organization's tastes and interests.

HRM is important in all organizations including construction (Kilby and McCabe, 2008). It contributes to organizational success (Huselid, 1995) and creates competitive advantage for the organization (Amit and Belcourt, 1999). Armstrong (2006) said that people are the most valued asset for an organization. People contribute to the achievements of organization's objectives both individually and collectively and deserve to be treated in a way that reflects so. HRM helps to create this environment by changing the attitude and behavior of employees toward the organization hence better organization's performance is often realized (Kokkaew and Koompai, 2012). For an industry such as construction with productivity studies revealing below average performance (Zhang and Liu, 2006; Liu *et al*., 2006), the proper understanding and application of HRM is very vital. Project-based culture, temporary teams and fragmentation that are commonly mentioned as major causes for the poor performance are just indicators of the poor human resource management and understanding within the industry.

HRM is understood and discussed largely in large, stable organizations that are classically managed. However, in organizations that rely principally on projects such as construction, HRM is often marginalized in discussions about what it is and how it should be practiced (Huemann *et al*., 2007). This is because much of mainstream human resource management (HRM) theory is not applicable to this industry (Dainty and Loosemore, 2012).

Huemann *et al*. (2007) stated that certain specific features of project-oriented companies make HRM in such organizations different from the traditional HRM processes and practices for the classically-managed organization. The specific features of project-oriented companies include; (1) "managing by projects" as a strategy of project-oriented companies, (2) temporary nature of projects, (3) dynamism, (4) project-portfolio resource and multirole demands and (5) specific management paradigm. In "managing by projects" the HRM policies, processes and practices must somehow be supportive of project orientation and therefore it is different from traditional HRM for classically-managed organizations where the emphasis is not on projects but instead on routine products and services with well-defined and stable job requirements (Huemann *et al*. 2007). Due to the temporary nature of projects when a new project is introduced or an existing project is stopped, there is a change in human resource requirement and hence change in overall human resource configuration of the company. This is quite different from the classically managed organizations where the human resource configuration is relatively stable. The following sections will expound on this difference by discussing in detail HRM practices, policies and processes in the construction industry.

HRM Practices in construction industry

Human resource management practice is a management process of an organization's human resources. It aims to establish a more open, flexible and caring management style so that staff will be motivated, developed and managed in order to maximize their contributions to organizations' objectives. Consistent planning, monitoring and evaluation are key for the progress of HRM (Raj and Kothai, 2014). Successful implementation guarantees that all employees know their roles and responsibilities, and also feel part of the organization which is able to meet their expectations as well as the objectives of the organization. Construction working conditions became terrible during the Industrial Revolution in which building projects soared and workers were forced to work beyond their capacity. However they were paid relatively well though insufficient. Following the two centuries after Industrial Revolution, construction rate reduced. Hence pay, conditions and the prospects of workers through training and development fell to the smaller organization (Kilby and McCabe, 2008). Construction industry became unattractive and characterized as a labor-intensive and low-tech sector dominated by unskilled labor force. The employee turnover became high and there is a general need to develop good understanding of the HRM practices to improve this.

Many current HRM practices can be traced to the needs of companies in the 1950s to develop and retain talent (Cappelli, 2015; Grattone*t al.,* 1999). Employee motivation through workers participation, team belonging, recognition, management and commitment, and effective training schemes in the construction industry have brought about an increase in efficiency and effectiveness of the workers (Raheem and Bankole, 2014; Yankov and Kleiner, 2001). And it is the theory that is widely accepted in the U.S. construction industry. Motivation being the inner power in the process of human resource enhancement is of much interest to construction managers as a tool to achieve an organization's goal (Kokkaew and Koompai, 2012). In Europe, financial matters and also psychosocial factors affect the work rate of the workforce in the construction industry (Arashpour and Arashpour, 2011). Dainty *et al*. (2007) said that the HR practices in construction industry are still informal.

The industry is described as a craft labor market. To shift

the industry to an occupational labor market Clarke and Herrmann (2004) suggested a package of formal HR practices for directly employed staff coupled to an industry-wide training and obligatory skills certification scheme. In this way, the HRM provides good training and development opportunities for employees to enhance individual skills and flexibility of roles (Mullins, 1999). This will improve the confidence and work standard among the construction workers.

HRM Policies in construction industry

Human resource policies are strategies on the approach the organization aims to adopt in managing its people (Armstrong, 2001). It states the intent of the organization about aspects of human resource such as recruitment, promotion, compensation, training, and selection (Durai, 2010). In construction there is a mindset in which workers are seen as 'commodity' that can, at best, be effectively managed using personnel policies and procedures; at worst they are simply 'hired and fired' and it is difficult to confront such a culture (Kilby and McCabe, 2008). Employees are the most precious resources in the construction industry (Kilby and McCabe, 2008) so policies and guidelines that an organization intend to adopt should be able to address the welfare of the workforce. However, in most construction industries, employees are not considered as the greatest assets and are not being treated as such. This can be witnessed in the general industry policy on employee hiring and payment. There is common use of casualized employees who are usually employed and paid based on output but without any deduction for tax, insurance and pension contributions that are left as the responsibilities of the worker (Kilby and McCabe, 2008). This was the cause of the National Building Strike of 1972 in Britain in which such a policy was fought to be abolished.

In the construction sector, the needs of the people are subjugated by performance concern (Dainty and Loosemore, 2012). Thus employee interests are not of primary concern. This has potentially dire consequences for those who work in the industry, for the organizations that employ them and eventually, on the prosperity and productivity of the industry as a whole (Dainty and Loosemore, 2012). For the construction industry to be successful, there must be a fine line between companies' interests and employee well-being. In the dynamic environment in which the human resource configuration is constantly changing, the challenges of ensuring employee's well-being and proper treatment of workers is important (Huemann *et al.,* 2007). It is therefore necessary to consult, discuss and agree with the employee representatives before implementing any human resource policy. The casual nature of recruitment in the construction industry is encouraged by decentralized system of recruitment common in most construction firms. In decentralized recruitment system, recruitment is done at both the head office and the site office (Raheem and Bankole, 2014). In such a recruitment system formalization of the process is very difficult (Brandenburg *et al.*, 2006; Maloney, 1997) and application of strategic planning is hard. Maloney (1997) defined strategic planning as a process whereby the objectives of an organization are developed and the actions required to meet those objectives are identified. With a strategic policy in place to ensure meeting clearly defined company objectives, there is little room for informal and workforce casualisation. Strategic human resource planning is possible in construction firms and leads to higher organizational performance, including higher productivity, greater cost effectiveness, and greater overall efficiency (Ferris *et al*., 1990).

HRM Processes in construction industry

HRM processes are the courses through which workers are subjected by an organization in order to better contribute to organizational objectives. It starts with the way that the employees are obtained, then their development through trainings and all the other organizational aspects of improvement that are available. It also ensures that there is career structure to keep them in the organization (Kilby and McCabe, 2008).

In the construction industry, non-standard employment is common accounting for around half of the industry's total employment (Loosemore *et al*., 2003). Recruitment is done both at the head office and at the site. However, recruitment at head office seems to be focused on construction management and technical staff while site workers are mainly recruited at sites (Raheem and Bankole, 2014). On the job training is the most practiced method by construction firms for training and development of human resources especially for site workers (Raheem and Bankole, 2014). Full-time well educated highly skilled permanent workers are more likely to receive training (including long-term) than their insecure and unskilled colleagues (Forde *et al*., 2005; Cully *et al*., 1999). This can be attributed to the hefty reliance on self-employment in the industry. Casualization of the recruitment process makes employers reluctant on training employees since their stay at the company is deemed only temporary and may not last long enough for the training investment to be realized (Dainty and Loosemore, 2012; Dainty *et al*., 2007).

According to Kokkaew and Koompai, (2012), in order to maximize the effectiveness of human resource management in construction industry, strategic human resource management, job analysis, training and development as well as performance management are key. These require detail planning by an organization especially before an employee is recruited.

The organization should be clear on the skill requirements, roles, possible future trainings and how performance measurement will be conducted well before an employee is recruited. Through this, employee quality can be ascertained which will ensure longevity in the organization. This form of strategic planning answers the three key R-aspects (Respect, Recruitment and Retention) that were called for in 'Respect for People' (McCabe, 2007). This is also in line with the recommendation of Raheem and Bankole (2014) who pointed that to foster quality production and ensure excellent professionalism in construction, workers should be recruited through the human resource department after satisfying all criteria for selection of workers for that particular work. Good trainings and development to improve construction techniques can be achieved through frequently organized seminars and trainings by the human resource department.

The Two-Tier Approach for Construction HRM

A Two-Tier Approach has been developed and proposed to improve HRM in construction section. The approach consists of two workforce management strategies; Tier I which was developed by Construction Industry Institute (CII) and Tier II which was developed by Center for Construction Industry Studies (CCIS) at The University of Texas at Austin.

Tier I

Tier I is a HRM approach designed to efficiently manage standing workforce, irrespective of its skill level. The focus is on organization, communication, and utilization of field management (Brandenburg, 2004). Tier I strategy improves the effectiveness and productivity of the construction workforce through effective supervision and project management (Brandenburg, 2006). Supervisors (including general foremen, foremen and super intendants) must have strong management abilities to effectively coordinate and manage their team. Management, communication, and technology utilization are emphasized at all levels of the project. Characteristics of Tier I were summarized by Brandenburg (2006) as shown in Table I.

Tier II

Tier II is a revolutionary and future-oriented HRM approach designed to enhance workers' value by increasing their skills and productivity (Borcherding *et al*., 2001). The goal of this increased value is increased wages and longer careers in the industry (Brandenburg, 2006). This approach also ensures formalization of recruitment processes which is key in solving HRM issues in an industry that has a tendency to transfer power away from centralized personnel departments to site managers. It promotes the need to train, develop, and retain workers because of their increased value. Tier II solves the widespread problem of 'hiring to fire' in which many workers are hired as casual laborers. Casual laborers are poorly skilled and with little or no idea of the standards and working practices.

Tier II provides effective training and development opportunities for all employees. This enhances personal skills and multi-skill capability (Du *et al*., 2007) and develops not only the company but the industry in the long run (Ramlall, 2003). In the present construction industry, the cost of labor accounts for a significant portion of the total construction cost (Loosemore *et al*., 2003) but Tier II lowers labor costs because fewer workers are required on site (Tucker, 2001). A higher productivity is realized through more effective human resource management without compromise or sacrifice of the construction work (Kokkaew and koompai, 2012). Characteristics of Tier II were also summarized by Brandenburg (2006) as shown in Table I.

HRM and construction accidents

HRM and accidents in construction industry are strongly linked because accidents involve human aspects in one way or the other. Lubega *et al.* (2000) said that accidents in construction include not only direct physical injury to persons or damage to property but also short and long term effects or incidents due to other exposures on sites that affect the worker's health and physical well-being. The profession of construction became common place to death and injury during the Industrial Revolution. There was a lot of work to do and profit became more valued than workers' conditions and safety (McCabe, 2007). During this period subcontracting became common. There was little training given to employees who were in demand. Subcontractors were under pressure and would press supervisors/gangers to force their men to work faster and take risks and injuries increased (McCabe, 2007). Nevertheless a research done by Coleman (1991) revealed that nearly 90% of all construction accidents leading to death can be prevented of which positive management can contribute up to 70%.

Sawacha *et al*. (1999) named top five important issues that are associated with site safety. Interestingly all these are related to HRM in one way or the other. They are (1) Management talk on safety, (2) Provision of safety booklets, (3) Provision of safety equipment, (4) Providing safety environment and (5) Appointing a trained safety representative on the site. In addition to these we add the aspect of (6) Personality/individuality that contributes to 70% or more cases of accidents (Haslam *et al*. 2005).

HRM practices and construction accidents

Management talk on safety is a measure of top management commitment to workers' safety. Previous

Table 1. Tier and Tier II Characteristics.

Tier I	Tier II
Highly skilled front-line supervisors in all crafts	Highly skilled journey-level workers in key crafts
Single-craft journey-level workers	Multi-craft journey-level workers
No pay differential to workers for skill	Workers are paid a higher wage for their higher skill level
Traditional top-down management structure	Proactive, horizontal management structure
Strong communication between supervisors and managers	Strong communication between journey-level workers and project managers
Information technology used extensively at supervisor and project management level	Information technology used extensively at all levels
Large labor pool available (possibly unskilled)	Skilled labor pool available
Management, computer, planning training available to supervisors only	Management, computer, planning training available to journey-level workers
Task training available to all workers	Craft training available to workers
Traditional hierarchical work environment at crew level in all crafts	High performance work teams utilized at crew level (for key crafts)

Source: (Brandenburg, 2006).

research has shown that avoiding engaging in risk-taking behaviors was related to enhanced feelings of workers' responsibility for safety and more positve assessment of senior management commitment (Yule *et al.*, 2007). Frequent communications about safety by top management make the workforce feel that they are valued by the management and hence risk-taking becomes minimal. Having a clinic/first aid rooms at the site can also depict the level of management commitment to safety. Supervisors or front-line managers are key individuals in accident prevention. In their daily contact with staff they have the opportunity to control unsafe conditions and acts leading to accidents (Simard and Marchand, 1994; Chew, 1988). In other words they set the tone for the work atmosphere and hence safety climate for their operatives (Flin *et al*., 2000).

Personal involvement and participatory involvement by supervisors with their workforce in safety activities rather than a centralized bureaucratic relationship also seems to promote safety (Simard and Marchand, 1994). In their research, Shannon *et al*. (1997) found that good relations between management and workers was consistent with lower injury rates. Appointment of a safety manager (Simard and Marchand, 1994) and a safety committee (Flin *et al*., 2000) help in creating a safety system in the company. The HRM department's role is to ensure and enforce safety by recruiting safety manager(s) and establishing a safety committee. Supervisor evaluation for performance and rewards should also include assessment of level of participatory involvement and safety talks given to workers and also the number of injuries registered among his/her crew members.

Haslam *et al.* (2005) pointed out that economic climate is an originating influence to construction accidents. Timely payments and rewards show the level of commitment to, and value placed on, the workers and are crucial for productivity (Kilby and McCabe, 2008). It creates an environment where workers are less stressed, happier and focused on fulfilling company goals. On the contrary poor and untimely payments tend to increase the risk of injury. Workers should frequently be monitored and assessed based on their attitudes towards work. Unsafe and unscrupulous behaviors that can lead to accidents (personal or workmates) shouldn't be tolerated with possible dismissal. We discuss other practices such as employee motivation and training under HRM policies and processes in relation to construction accidents respectively.

HRM policies and construction accidents

In their research, Sawacha *et al.* (1999) found that safety performance in the United Kingdom Construction Industry was most dominantly influenced by organizational policy. Poor HRM policies in construction can be traced back to during the Industrial Revolution. During this period the culture of the emerging industry was shaped into one in which speed, agility, and fearlessness became the prized attributes (Kilby and McCabe, 2008). Casualization of employment process became common. Workers were hired to be fired at the end of projects. This is still the status quo in today's construction section (Kilby and McCabe, 2008). With this type of mindset, employee perception of the value the organization places on them is reduced and this can in some cases increase the chance of risk-taking (Yule *et al*., 2007). High employee turnover is also associated with such a culture and with it increased injury rates (Shannon *et al*., 1997). Employee turnover and injury rates are associated by the learning curves, new experiences and mastering of a new job. Strong HRM policies that ensure centralization and formalization of the recruitment process for longer retention can contribute to solving this. Employees should also be insured against accidents.

Hinze and Gordon (1979) found that supervisor-worker relationship affects injury rate. The HRM department must constantly nurture, monitor and reward this relationship to create a better working environment. Incentives for safe operation should also be given at personal and team levels (Konkolewsky, 2001). Outsourcing and subcontracting do not guarantee skills and performance and may impair organization's ability to control some processes making it difficult to implement coherent HRM strategies (Dainty and Loosemore, 2012). Construction firms (including large firms) should focus on creating and developing their own human resource base.

Policies on working conditions must be clear. Compromised safety is linked to tiredness and fatigue leading to reduced concentration (Haslam *et al*., 2005). Bonus pay and overtime works should be discouraged. Bonus payments can lead operatives to achieve higher production through performing unsafely (Sawacha *et al*., 1999). It is a motivation to work faster and thus encourages the use of unsafe methods like risk-takings. Leather (1983) found that 67% of foremen and 43% of housing managers in the Public Sector Group did consider bonus targets to be a major contributing cause of risk-taking and corner-cutting by the direct labor operatives. HRM can indirectly reduce the rate of accidents that occur from overtime works and productivity bonus pay by assigning moderate amounts to overtime works and productivity to discourage such activity from happening in the organization. Assigning high overtime payment may have negative implication on project schedule and accidents as the workers may intentionally slow their work during the norm time in order to be caught behind schedule and hence earn overtime and productivity bonus payments. When it is deemed necessary to assign productivity bonus, a safety bonus is advised instead as it combines productivity and safety performance as a goal for reward (Sawacha *et al.,* 1999).

HRM processes and construction accidents

Many of the accidents in the construction industry arise from workers' negligence, ignorance, and carelessness (Lubega *et al*., 2000). Understanding employee personality, capability and talent is vital for accident prevention in construction industry. It should guide the HRM department to decide acceptance for recruitment based on possibility of required future trainings to ensure required safety climate in the organization. Where coordination is required, poor command of local language can impair safety and productivity (Haslam *et al*., 2005). Sawacha *et al.* (1999) found that a strong correlation between care for personal safety and safety performance exists and employees who are concerned about personal safety in their work approach have better safety record. HRM Department should include safety among the factors evaluated during interviews and tests for the selection into the organization and also during assignment to a given project. Language and personal safety history should also be considered.

There is a strong relationship between age and experience and level of safety performance of workers. Younger workers register more non-fatal accidents than older ones (Sawacha *et al*., 1999; Salminen, 2004). The trend falls steadily to reach a low point in mid-forties. This is because the older the operative gets the more experience and safety requirement awareness gained. However older persons seem to be more subject to fatalities than younger ones. Jeong (1998) found that workers aged 45 and above have highest number of injuries. This could be because of lack of mental agility, sensory deficiencies, and the longer time required by the older worker to learn when put into a new situation (Pratt *et al*., 1996). Seniority of workforce is consistently related to lower injury rates (Shannon *et al*. 1997). Employees are more prone to accidents in the first years of their work with an employer. Jeong (1998) found that 95.6% of non-fatal injuries and 92.5% of deaths occurred during the first year of employment. Experience and age should be factors of consideration during selection for recruitment into the company and assignment of workers to construction projects depending on project type. Pre-employment screening/health surveillance should also be done to take only healthy and capable workers.

Tasks that are considered 'dangerous' should have only experienced and aged workers controlling or supervising it or even working on them. It may require an extra effort from the HRM Department to secure such a service by searching for the required expertise or outsourcing. This can seem expensive or waste of time from a layman's point of view. But may prove more economical in the long run taking into account the direct and indirect costs the organization would incur in event of probable accidents when working with inexperienced employees. Factors such as loss of company's image due to frequency in accidents, fatalities of employees and legal cases can prove more expensive in the long run. On the other hand the accumulation of loss of working hours and days and poor publicity due to accidents is more costly to the organization. When deciding whether to work with a relatively cheap inexperienced organization employee or employ and/or outsource experts for the particular task, the HRM Department should consider all the risks involved.

Safety trainings amongst workers was reported to be important in preventing accidents in the work of Hale (1984). However most construction firms have not adopted safety trainings. In a research done by (Sawacha *et al*., 1999), ninety-two percent of operatives reported that they have been asked to operate machinery without adequate training. The use of both short-term and long-term training at places like training centers, rather than on-the-job training is more beneficial (Tabassi and

Bakar, 2008). Effective training is an important factor for implementation of HRM in construction projects (Tabassi and Bakar, 2008). López *et al*. (2008) concluded that workers in different work age group may require different specific trainings.

During the separation phase, the HRM Department should come out with a strong way forward that reflects the company's commitment and love towards the worker for his service. This may include financial help and frequent communication. When a worker is fatally injured or injured to the level that he can no longer serve the company, special benefits can be conferred on the family depending on the service he/she has offered to the company.

HRM and OHS in construction industry

Occupational Health and Safety (OHS) is a component of HRM (Zanko and Dawson, 2012). Successful management of OHS is crucial to the construction industry because of the direct and indirect costs of mobilizing human resources. A number of disciplines have helped to further the knowledge of OHS. Despite the many developments, a challenge still remains to improve the skills of managers and make them aware of their responsibilities on the subject of preventive and corrective measures to improve occupational health and safety. Gravel *et al*. (2013) revealed that OHS problems are related to difficulties with work organization, management, wearing of protective equipment, harmonization of work methods and physical or psychological overwork. Recruiting and retaining a competent workforce, poor work relations, increased absenteeism and staff turnover, and lack of work/family balance are the problems associated with HRM (Gravel *et al*., 2013). The impact of increased workload on employees' mental health can be measured from the angle of imbalance: (1) job demands-control imbalance (Karasek model) and (2) effort-reward imbalance (Siegrist model). Vézina *et al*. (2006) said these imbalances are indicators of perceived poor health. It is vital that managers in the construction industry understand the economic and organizational issues associated with OHS and that they master the associated problem-solving processes. In addition, managers must be able to critically analyze risks and mobilize human and material resources to overcome them in a lasting way. Some workers believe that the failure to wear/use safety clothing and equipment ought to be punishable offense through sanctions imposed on the offender. They suggested that such a sanction should be written into the Contracts of Employment (Sawacha *et al*., 1999). In another study, (Shannon *et al.,* 1997) also found that good housekeeping was consistent with lower injury rate among workers and Konkolewsky (2001) pointed to the importance of highlighting danger spots.

Tier II and construction accidents

A quick summary of the discussions of the HRM practices, policies and processes in relation to construction industry accidents points out the following among others: (1) recruitment of safety manager(s) and establishing a safety committee, (2) timely payments and rewards, (3) assessment of rewards to include supervisor participatory involvement, safety talks given and number of injuries among crew members, (4) centralization and formalization of the recruitment process for all workers with employee retention focus, (5) insurance of employees against accidents, (6) standardized salary scale where employees are paid on guaranteed monthly basis not based on work load performed, (7) encouragement of standard working hours (for example eight hours per day), (8) discouragement of bonus pay and overtime works by lowering rates, (9) consideration of employee personality, capability, talent and injury history during recruitment, (10) creation and development of a company's own human resource base through frequent trainings and talks, (11) promoting seniority of workforce, and (12) avoiding on-the-job training but upholding regular safety trainings at places like training centers. Considering all these factors and the characteristics of Tier II Workforce Management Strategy, it therefore follows that Tier II Workforce Management Strategy if properly implemented is better suited and positioned to significantly reduce accidents in the construction sector. It has few multi-craft highly skilled journey-level workers who are satisfied because they are highly paid. They are better trained and are not under pressure of job insecurity and they feel that they are valued by the organization/company. Workers under Tier II approach are therefore well placed to avoid accidents during construction.

CONCLUSION

This paper reviewed accident situation and HRM literatures in construction industry. It also examined how HRM can be used to mitigate construction accidents. Proactive HRM is the way to go for construction industry for efficiency, effectiveness and safety. The impact of Proactive HRM has already been felt and contributing towards making British Construction more effective and efficient (Kilby and McCabe, 2008). The concept of hiring to fire promotes unsafe behaviours and should be fought in the construction industry. Prioritization of employee retention will help in fighting accidents. Employees should only be recruited in a formal process under the HRM Department after passing all selection procedures and requirements of which safety concern should be highly weighted. Project managers shouldn't be allowed to employ without the consent of the HRM.

There is a strong need for policies on continuous Human Resource Development (HRD) programmes to be put in place by construction companies and also ensured through government policies. On-the-job trainings should be discouraged as it is a form of experimentation on human beings with possible dire consequences. Appointment of safety managers and participatory involvement of supervisors is consistent with lower injury rates. Enhancement of people's importance is central to lowering injuries in the construction industry. The factors discussed point out that Tier II Workforce Management Strategy is a good model that can significantly reduce construction accidents if widely implemented. More work should be done to find out how Tier II Workforce Management Strategy can be affordably and easily adapted by construction companies especially in developing countries where unskilled labour force seems to be the only cheap available human resource at the moment and for the near future.

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