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Reality check against skilled worker parameters and parameters failure effect on the construction industry for Bangladesh

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ABSTRACT

Labour skill has a significant impact on time, cost, and quality of a construction project. The competitive construction industry forces companies to increase their labour skill to remain their positions in the industry. It is universally agreed that the skilled worker is one of the main fuels to run construction industry. A skilled worker must have a professional training, minimum 2 years working experience, and have the knowledge of construction materials, equipment and safety and physically fit. To check the status of the worker against nine main parameters of skillfulness of the worker is the key to the study. A questionnaire was designed with very deep literature research and expert opinion. The data were collected through questionnaire survey amongst the construction workers in Bangladesh. The percentages of workers found in this study having full knowledge and practicing regulation of construction safety, materials, equipment’s and tools, labour codes and building code are 19.35%, 6.45%, 9.68%, 4.87% and 2.30%, respectively. The workers in the study area having the professional training, minimum education and minimum working experience are 6.45%, 46.06% and 62.50%, respectively. A total of 62.25% workers are found physically sound. Building code practices and awareness building is the driving key to enhance skills of worker.

KEYWORDS

Bangladeshi Construction Industry; parameter failure effects; questionnaire survey; worker status level; skilled worker parameter

Introduction

Construction industry plays a significant role in the way of contributing to the overall development of Bangladesh as it enhances the economy and generates a huge employment field. Bangladesh is one of the most densely populated countries in the world with 163 million population (Bureau 2017) and more than 1252 people live in per square kilometre (WordBank 2017). For this huge size of the population, a huge in number but uncontrolled construction industries are growing quickly. This huge amount of uncontrolled construction industries are operated by the huge amount of worker.

Workers are the major key to the successful running of the construction industry. The workers without skill do not brings any benefits to the construction industry rather complexity and risk. So it can be said that the unskilled workers itself a risk and threat to the construction industry. If a high level of construction output is predicted by authority have to be achieved, then the raising concern is how unskilled worker can be met the parameters of skilled (Agapiou et al. 1995). Unskilled worker is the main factor of construction delays and cost overrun (Koushki et al. 2005). Unskilled worker is one of the most significant causes of accident on construction site (Abdelhamid and Everett 2000; Suraji et al. 2001). The shortage of skilled worker is the major factor that affects the quality in construction (Chan et al. 2004; Enshassi et al. 2009; Abas et al. 2015) Construction delays, quality issues, cost overrun and safety-related issues are the major barriers that obstruct the progress and success of construction project. If any of these has occurred, the whole project is undoubtedly going to be failed. As a result, the individual, local and national economy are affected and the rate of infrastructure development is decreased. So, skilled worker is the most important element for the successful growth of our rising construction industry. There is no structured definition to define a skilled worker in construction industry. The parameters of skilled worker are varied from person to person and nation to nation. In Oxford Dictionary, the skilled worker is indicated as ‘having or showing the
knowledge, ability, or training to perform a certain activity or task well’. The workers are skilled who have professional training, working experience and have knowledge (Schön 2017). Menard (2017) said that construction workers are skilled who have specialized training or skills, capable of exercising judgment, and have knowledge of the particular trade they work and a minimum college education. The Department for Federal Skilled Worker (FSW), Canada (FSW 2017) stated that the main parameters of skilled worker are education, work experience, knowledge of work and others. But in Bangladesh there are no official parameters of construction skilled worker by which one could be said to be a skilled worker. In this study, nine parameters of construction skilled worker are established with respect to the perspective of Bangladeshi construction industry.

About 82% of construction company experiences the shortage of skilled workers (Makhene and Thwala 2009). Skilled workers shortage is not due to the shortage of workers rather it is the shortage of adequately trained skilled and productive workers for certain jobs. Bangladesh faces the crisis of skilled worker more tremendously than other developing countries. A report indicates that about 31.32% workers of construction sector in Bangladesh are skilled while rests are unskilled (Limited 2010). Bangladesh needs another 4 million skilled workers in construction sector by 2021 to meet the requirements of the growing economy (Report 2016). To sustaining the sustainable improvement of the construction industry as smoothly, the skilled worker is the major required challenge to meet. So, the most crucial problem of construction industry is the shortage of skilled worker in Bangladesh.

Thus, it is necessary to keep updated with actual status level and essential information of worker in construction sector for understanding the actual situation of construction work force to monitor, control and improve. If the real scenario comes to light, it will be easier for the authority to take effective necessary steps to improve the quality and standard of workers in Bangladesh. For this, the study was conducted to find the real status level of construction workers against each set parameter of skilled worker. It also finds the failure effects of each parameter on construction project. This study will help to find out the causes and responsible elements for the lacking of sufficient skilled workers by analysis the worker status level against each parameter of skilled worker in Bangladeshi construction industry. It will also offer some suggestions which can play a vital role to decrease the crisis of skilled worker and turn the unskilled worker into skilled.

**Research methodology**

This study is undertaken in two perspective process. At first, the parameters of skilled worker are set from discussion with experts and a comprehensive literature review. Figure 1 shows the entire process of conducting this study. The figure represents the step-by-step process of this study in a sequential order.

**Setting out the skilled worker parameters on Bangladesh perspective**

To conducting this study, we are setting out the parameters of construction worker considering Bangladesh’s socio-economic state, national labour condition, compatibility of construction industry, and other issues. At first, after a comprehensive literature review of journal paper, Internet, newspaper, and reports, a list of parameters have been sort out initially from it. The reviewed literatures are US Citizen and Immigration service (Security 2018), Alberta province official website, Canada (Alberta 2018), Construction Labor Contractors, Blog (CLC 2018), S. E. Shoo et al. (Khoo et al. 2007), Erin Tolley (Tolley 2003), USLegal (UsLegal 2011), Manolo Abella (Abella 2006), and Breschi et al (Breschi and Lissoni 2009). Some of the parameters are added, some of subtracted and finalized the set of parameters through a comprehensive discussion with an expert panel. The expert panel consist of the following:

1. High officials from the Ministry of Labor and Employment, Bangladesh Government.
2. High officials from Safety and Right. Safety and Right is a non-government organization promoting health and safety and enforcing rights of worker in Bangladesh.
3. High officials from Imarat Nirman Sramik Union Bangladesh (INSUB) (in English ‘Building Construction Labor Union Bangladesh’). This union is protecting the right and work for the welfare of the construction workers in Bangladesh.
4. A group of civil engineers, architects, construction project managers and contractors who have more than 15 years of working experience in related field.
5. University Professors who teach at related school and department at different university in Bangladesh.

After all the review and the discussion, a final set of parameters of construction skilled worker for
Bangladesh is coming out. A construction worker is said to be skilled worker if he/she:

1. Knows and executes construction-related safety regulations in workplace
2. Knows and executes the Bangladesh National Building Code (BNBC)
3. Knows and follows Bangladesh National Labor Law
4. Knows and follows about construction material-related issues (merit, demerits, safety, standard use procedure and process, storage)
5. Knows and follows about construction equipment and tool-related issue (standard operation procedure, safety, maintenance)
6. Has professional training on related work
7. Has a minimum 2 years of working experience on related field
8. Has a good physical condition for performing his work
9. Has a minimum primary education (class 5)

**Questionnaire design**

The research data were collected through a survey among the construction worker. For this, a questionnaire was designed with nine parameters of skilled worker in construction sector. The designed questionnaire is divided into three parts. **Figure 1** shows a scanned copy of designed questionnaire having three
parts of it with the response of a worker. Part I is about the general information about the respondents. Part II contain five parameters of construction skilled worker and the respondents dealt with the following five types of answer against each parameter: (A) Known and followed, (B) Known but not followed, (C) Partially known and followed, (D) Partially known but not followed and (E) Unknown. From the five types of answer, worker chooses only one type of answer against each parameter that indicates his/her status level for this parameter. In part III, respondents were requested to answer another four parameters of construction skilled worker and the answer of the questionnaire can be given in two different ways, namely (F) Yes and (G) No. From the twos type of answer, worker choose only one type against each parameter that indicates his/her status level for this parameter. Figure 2 shows a surveyed questionnaire responded by a worker. Parts I and part II of questionnaire represent the status level of the worker against each set parameters.

Data collection

The necessary data were collected through the questionnaire survey among the construction workers by visiting construction sites, labour unions, labour welfare trust, and government agencies and so on. A total 87 sets of questionnaire were distributed amongst the workers. Seventy-one sets were returned of the 87 sets of the questionnaire, which is 82% of total distributed sets.

Data analysis

Table 1 represents the demographic characteristics of the respondents.

The numbers of workers are categorized into five groups based on their answers against each parameter in part II and two groups in part III of the questionnaire. The following equation is used to calculate the percentage of workers for each type of answer against each parameter:

$$W = \frac{Q \times 100}{N}$$  \hspace{1cm} (1)

where $W$ indicates the percentage of workers who choose ‘P’ type answer. Here, $Q$ is the total number of worker who choose ‘P’ type answer (in equation (1))
‘P’ is a symbol used for indicating any type of answer, for this study \( P = A, B, C, D, E \) or \( F \) type answer) and \( N \) means total number of workers (for this study \( N = 71 \)).

**Result and discussion**

The set parameters of skilled worker in construction industry are analysed by the collected data through a questionnaire survey. The actual current status of the construction workers in Bangladesh is not so good. There are a million of worker in Bangladesh who have no signature education, no professional training, not aware of health and safety, physically weak and so many issues that negatively affect the productivity, schedule and quality of construction project. Figures 2 and 3 show that a huge amount of unskilled workers are involved in Bangladeshi construction industry. This is one of the prime factors that is interrupted the advancement and improvement of construction industry in Bangladesh.

**Construction safety**

Today in the construction industry, there is no concerning issue as important as construction safety. In developed countries, it is taken a great attention that is why authorities and government take various measures to ensure construction safety. But in developing country, construction safety is the bloodcurdling concern because of avoiding and violating health & safety regulations mostly, whereas in Bangladesh no adequate attention is drawn by the authority and workers in this regard. A clear picture is disclosed with the current worker status level on construction safety culture in Bangladesh in Figure 2.

Figure 2 shows that 9.35% of the workers properly know and 2.80% of the workers partially know the construction safety and both groups of workers practice the regulation at working sites based on their knowledge of safety. About 15.58% of the workers know where 26.24% of workers partially know the regulation of construction safety but they do not practice the regulation at working sites. Almost half of the total workers about 46.03% are not aware of construction safety regulations and know nothing about construction health and safety. So they do not take any safety measures during work.

This current status of construction worker is brought out many tremendous issues that make the industry as hazardous one than any other industry in the country. In average, 150 workers have died and thousands of workers are fallen victim in low to high impact injuries due to construction accident at workplace every year in Bangladesh (SRS 2010, 2011, 2012, 2013, 2014, 2015, 2016, 2017). Failure of adoption and assurance of construction safety have affected the project negatively. It is the main cause of project delay (Aziz and Abdel-Hakam 2016; Burr 2016), affecting the quality of construction work (Zeng et al. 2015; Larsen et al. 2016; Rumane 2016), decreasing the labour productivity (Hiyassat et al. 2016; Sveikauskas et al. 2016), cost overrun of the project (Shehu et al. 2014; Jadhav et al. 2016), arising dispute between stakeholders (Gunduz et al. 2017), and affecting the psychology of worker negatively (Leung et al. 2016).

![Figure 3. Statistics of worker status against skilled worker parameters for questionnaire part III.](image-url)
BNBC

BNBC is the only government issued regulations and guidelines for the building construction sectors in Bangladesh. It is contained legal and technical specifications, construction health & safety, quality of construction, environmental regulations for construction, worker wages and rights and others. So avoidance, violation and elimination of BNBC might be brought the project into construction accidents, quality hazards, worker conflicts about wages and rights, negative impact on environment, dispute on legal issues and so on. It is very significant to know and understand the current worker status against this parameter of skilled worker that is how the workers know and execute the BNBC in construction project in Bangladesh.

Figure 2 indicates that more than half portion of the workers in construction sectors do not know about the regulations and guidelines of BNBC and the amount is 55.61%. Only 2.30% of workers properly know while 16.13% know partially and they follow and practice BNBC guidelines and regulations at working site. Other 5.88% of workers know and 20.08% of workers partially know the regulations and guidelines of BNBC but they do not follow and practice at working sites.

Avoiding and violating of BNBC in Bangladesh is a legal dispute and it is a punishable crime. Government agencies can temporarily suspend, stop or ban the project where BNBC is avoiding and violating. Some literature (Ahmed 2010; Rahman 2012; Biswas 2014; Shill 2015) state that this brings out legal disputes, delay or even stop, cost overrun, additional compensation in any construction project. Avoiding and violating of BNBC is main causes of construction accident and hazards (Al Mamun et al. 2014) and affecting the quality of construction (Biswas 2014). So is very important and essential to know, follow and execute the BNBC guidelines and regulations for the construction worker for the betterment of himself and all over the construction industry.

National labour law

Most of the Bangladeshi construction workers are not aware of the national labour laws. Figure 2 presents the current culture and attitude of construction worker towards national labour law in Bangladesh. A huge amount of construction workers about 72.53% are totally unaware and do not know about the national labour laws/acts. Only 4.87% purely know while another 2.50% partially know and they follow the labour laws at their professional filed. Another 14.65% know and 5.45% partially know but they do not follow or practice the labour laws.

Because of unaware of labour law, workers are not getting their rights and wages. It is the main cause of worker-strike which brings the loss of productivity (Ibbs and Vaughn 2015) and delays the project completion (Birgonul et al. 2015). In the case of accidents, workers do not get proper compensation from the authority because of their ignorance of labour acts and they are felt betrayed (Morrison and Robinson 1997). This feeling of betraying drives them to faulty and unsafe work which negatively affects the organization he work for (Rayton and Yalabik 2014). It is also considered the major causes of construction accidents and quality hazards (Rayton and Yalabik 2014). All these things and their consequence create a negative impact on worker’s psychology to do the best in the perfect way.

Construction materials

Construction materials are the most important and obvious things to perform the construction project. If there are no materials, there are no constructions. But most of the construction materials belong some demerits with it. Workers always work with materials, so it is very necessary to the worker to know all the material’s properties and standard use procedures. But in Bangladesh worker are mostly unaware of this issue. Figure 2 indicates that 6.45% workers purely know while 24.93% workers partially know about construction materials, their demerits, standard use procedure and related safety issues. Also, they follow and practice these concerns at workplace. A quarter portion of 25.92% construction worker is totally unaware. Rest of 11.00% are known and 31.70% are partially known but they do not follow or practice at the workplace.

Unaware of construction material-related issues, this condition introduces some other issues that affect the project adversely such as accident, safety hazards, quality hazards, project delay and so on. Some materials are chemically harmful and need to take safety measures to work with that type of materials. This type of material leads a project into an accidental and quality hazardous one (Charehzehi and Ahankoob 2012) Some construction materials have exploitation, burning, scratching, wounding and cutting characteristics and unaware of this could thread to the safety and quality of project (Domone and Illston 2010). The standard proportion of materials must be
maintained unless the quality of work is hampered (Jingmond and Ågren 2015). Knowing about construction materials, the construction waste reduces reuse, and recycling process can be performed effectively (Yuan 2013). The above incident and their consequences lead a construction project towards accidents, safety hazards, quality failure, cost-overrun and construction delays.

**Construction equipment and tools**

A large numbers of construction workers in Bangladesh are totally unaware of the standard procedure of using construction equipment and tools, related safety measure of equipment and tools and training for them. Figure 2 shows the status level of the worker against this parameter. It is indicated that 9.68% workers purely know while 32.26% workers partially know the standard working procedure and related safety and they practice them at work sites. Another 23.43% workers know and 7.55% workers partially know but they practice at work sites. Rest of the workers 27.08% are unaware of this.

Unawareness of this issue turns the worker burden from the asset. Poor and faulty construction equipment and tools or fail to use in the right ways or both are the possible source of safety and quality hazard in construction project (Hardin and McCool 2015; Karakhan and Gambatese 2018). The operators must have the training to operate safely and appropriately (Gooch 2011). Thus, it is very important to know about Construction equipment and tools and practice safety measures and standard procedures to complete a project successfully and profitably.

**Work-related training**

Work-related training is a mandatory practice for any profession (Dong and Platner 2004). But in Bangladesh, training of construction worker, related to his work is a nightmare (Biswa 2014). How poor condition of worker training in Bangladesh has appeared clearly in Figure 3. A just 6.45% of total construction workers get occupational training and rest of the 93.55% workers do not get any training related to their work. This untrained worker force could be harmful to construction project in many ways.

Training has turned a worker to expert and more productive at his work (Billett et al. 2015). Untrained worker is one of the main causes of quality and safety hazards in construction (Love et al. 2015, 2016; Zhou et al. 2015). Figure 3 shows that the actual situation of Bangladeshi construction worker is in the question of occupational training.

**Working experience**

Working experience is one of the prominent parameters to become a skilled worker. In Bangladesh, a lot of newcomers are involved in construction work without any expertise. From Figure 3 it is shown the size of construction workers for both who have minimum two years working experience or not. A favourable amount of 62.50% workers have experienced for more than two years and another 37.50% worker do not have two years working experience. These inexperienced workers are considered as a threat to the project in many ways.

Lack of working experience of worker is decreased productivity of workers and increased the rate of errors at work (Frey and Osborne 2017). Working experience is made the worker enable to take a good decision and also make an essential asset to the company (Salleh et al. 2017). The inexperienced workers face more accidental event than an expert one (Wang et al. 2016). So it is really essential for all construction workers to learn and earn expertise.

**Physically fit**

Workers are the main fuel for every economic industry including construction industry. And physically fit workers are undoubtedly a valuable asset to the company. A big portion of workers are found with low to high impacted health issues in this study. Figure 3 shows that 69.25% workers are physically fit and other 30.75% workers have appeared with an unhealthy physical condition. This unhealthy portion of the worker has played a role of problem creator rather than an asset.

An unhealthy worker is worked under physical weakness and stress. This unfavourable condition has increased the possibility of error in judgment and derives him to make wrong decisions (Hammond et al. 2015). Construction accident is taken place at increasing rate when worker are not fit physically and psychologically for performing his work (Leung et al. 2016). Construction quality is also hampered by the unfit workers (Aljassmi et al. 2016). It is the major cause of construction accident, construction delays, quality issues, cost overrun and project complexity. So the authority must and worker must give a great attention to meet this parameter.
**Education**

A minimum level of education is necessary to the worker in any sector of work. The minimum level is set as class 5 for Bangladeshi workers in this study. In this study, the worker proportion is clearly displayed against the minimum education which is a major parameter of the skilled worker in Bangladeshi construction industry. Figure 3 indicates that only 46.06% workers have educated as required level (class 5) and other 53.94% workers are uneducated. This uneducated portion is liable for bringing threat to the construction project in many ways.

Educated workers can easily understand his job and give the best output (Cairo and Cajner 2018). They are more productive, aware of health and safety issues and able to take effective decision which turns a project into a successful one (Appelbaum 2013; Ammendolia et al. 2016). Thus it is very important for a worker to have a minimum level education and it is one of the essential parameters of skilled worker for Bangladeshi construction industry.

**Conclusion and recommendation**

Skilfulness of the worker is directly proportional to the labour productivity and hence the success of construction project. That is why many researchers have an attraction on this topic. Although there are several studies which examine the factors affecting labour productivity, there is scarce of study relating to the skill of the worker. For these reasons, we investigate the nine main criteria of skilfulness of the worker is the driving force of the study. A productive questionnaire was planned with very profound literature research. The data were composed through the questionnaire assessment amongst the construction workers in Bangladesh.

The first group of the questionnaire was analysed in five different ways and another group of questionnaire was in two different ways. A total 87 sets of questionnaire were distributed amongst the construction workers across the country and 71 sets were returned. Almost half of the total workers are unaware of construction safety measures, and hence they are falling into accidents every day at a higher rate. Some portions of workers know the safety rules but don’t follow the regulations and guidelines. A large portion which is more than half of the construction workers in Bangladesh do not know the BNBC Code and Labor Laws. Another other small portion of workers know the code and laws but do not follow and practice them at work sites. Around one-fourth of construction workers are unaware of construction materials, construction equipment and tools. Half of the workers completely or partially have knowledge of the guidelines for equipment and materials but don’t follow and don’t practice them at working fields. The percentages of workers found in the study described as part III of questionnaire having full knowledge and practicing regulation of construction safety, materials, equipment’s and tools, labour codes and building code are 19.35%, 6.45%, 9.68%, 4.87% and 2.30%, respectively. The workers in the study area having the professional training, minimum education and minimum working experience are 6.45%, 46.06% and 62.50%, respectively. In total, 62.25% workers are found physically sound. To increase the skill of the worker authors suggested some guidelines such as proper training of the worker-related to the safety measures, health and hygiene, risk management and other fundamental issues of construction sectors. To follow the building code and labour laws by the labour and authority would be the key factors to increase the skill as well as productivity of the worker.

**Disclosure statement**

No potential conflict of interest was reported by the authors.

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