

Analysis of Skilled Worker Criteria of Construction Industry

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Abstract: Construction industry is one of the dominating sources of economic growth and development of any developing country like Bangladesh. Skilled worker is the main fuel to run this industry. To enhance construction management processes worker is a vital factor. A major negative impact on the construction cost, schedule time and quality of construction work has been marked for the lack of skilled worker. A skilled worker is who have a professional training, minimum 2 years working experience, have a knowledge about construction materials, equipment and safety and physically up to date. The main objective of this study is to analysis the nine main criteria of skilled worker. It conducted by questionnaire survey. The questionnaire was designed by a comprehensive literature review. The data collected through questionnaire survey among the construction worker in Bangladesh. The workers in the study area having fully knowledge and practicing regulation about construction safety, materials, equipment and tools, labor code and building code are 19.35%, 6.45%, 9.68%, 4.87% and 2.30% respectively. The workers in the area having the professional training, minimum education and minimum working experience are 6.45%, 46.06% and 62.50% respectively. The physically up to date is found 62.25% in this study. Increased numbers of skilled workers boost the construction process that create a very positive effect in the construction field and enrich the national economy of Bangladesh.

Keywords: Construction Industry, Skilled Worker, Skilled Worker Criteria, Questionnaire Survey, Bangladesh

1. Introduction

Food, shelter and clothing are undoubtedly the basic need of human species. It is not surprising that the construction industry has been known to be the largest

industry of the world. Construction sector is one of the most important sectors in the world. 7.6 billion people are living in the world at present (Samir & Lutz, 2017). For this huge amount of population, a huge amount of residential building, shopping mall, educational building, hospital, office, mill, factory and so on are required. The construction sector dominates over a vast portion of the world economy and GDP. It generates about 6% of GDP of global economy (Mezher, 2011) and positively influences the growth of employment than the other related economic activities. Bangladesh is one of the dominant developing countries. It is one of the highest densely populated countries in the world. It has 163 million population (Bureau, 2017) and more than 1252 people live in per Square Kilometer (WordBank, 2017). For this huge size of population, a huge in number but uncontrolled construction industries are growing very fast. Construction sector contribute 7.88% GDP to the national economy of Bangladesh in recent year (STATISTICS, 2016). According to The Statistical Yearbook of Bangladesh, 2010, 57.1 million people involve in construction sector directly or indirectly and the percentage rate withstands 4.4% of total national employees (Yearbook, 2015). Construction industry has a significant role in contributing to the overall development of Bangladesh as it enhance the economy and generate a huge employment field.

Workers are the main fuel for successful running of construction industry and skilled workers are the heart of construction. But the most crucial problem of construction industry is the shortage of skilled workers. About 82% of construction industry experience the shortage of skilled workers (Makhene & Thwala, 2009). And Bangladesh faces the crisis of skilled worker more tremendously than the other developing countries. A report indicates that about 31.32% workers of construction sector in Bangladesh are skilled and rest of the others 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). Unskilled labor is the main factor of construction delays and cost overrun (Frimpong, Oluwoye, & Crawford, 2003) (Koushki,

Al-Rashid, & Kartam, 2005) (Mansfield, Ugwu, & Doran, 1994). Shortage of skilled worker is one of the significant causes of accident on construction site (Abdelhamid & Everett, 2000) (Suraji, Duff, & Peckitt, 2001). The shortage of skilled worker is the major factor that affect the quality in construction (Enshassi, Mohamed, & Abushaban, 2009) (Abas, Khattak, Hussain, Maqsood, & Ahmad, 2015) (Chan, Scott, & Chan, 2004). Construction delays, quality issues, cost overrun and safety related issues are the key factor of success of a construction project. If any one of them is occurred, the whole project is going to be failed undoubtedly. So, skilled workers are the most important things for the successful growth of our raising construction industry.

Thousands of workers are involved in construction industry in Bangladesh but most of them are unskilled. Skilled workers shortage is not the shortage of workers rather it is the shortage of adequately trained skilled and productive workers for certain jobs. To boost the industry, skilled worker is the most required thing. So it is necessary to keep up to date the essential information of skilled worker in construction sector for monitoring and understanding the actual situation. 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 of Bangladesh. This study will help to find out the causes and responsible elements of lacking sufficient skilled workers in construction industry in the country. It will also offer some suggestions and solutions which can play a vital role to meet up the crisis of skilled worker in Bangladesh.

2. Research Methodology

This study is undertaken in two perspective process. At first the criteria of skilled worker is identified by discussion with experts and a comprehensive literature review including journals, conference papers, books, newspapers, reports, articles blogs and websites. Through the literature review, some criteria of skilled worker were selected, some were merged and deleted, and some

factors were found in Bangladesh perspective. In this study 9 crucial criteria were selected that must be possessed by a skilled worker. (Regets, 2001) (Neumark & Wascher, 2004) (Investopedia, 2013) (UsLegal, 2011) (Bresnahan, Brynjolfsson, & Hitt, 2002) (Kahn & Lim, 1998), (Khoo, McDonald, Voigt-Graf, & Hugo, 2007; Tolley, 2003). A skilled worker is he who knows the safety measures and regulations, the BNBC, the Labor Code, the procedure of using construction materials according to their merits and demerits, use of related safety equipment and practice them at construction site. And the second is questionnaire survey among the construction workers. For the questionnaire survey, the study set out 9 fundamental questions on criteria of skilled worker.

3. Questionnaire Design

The research data were collected through a designed questionnaire. Each questionnaire was divided into 3 parts. Part I is about the general information about the respondent. Part II contains 5 major questions on the criteria of skilled worker and they deals with the following 5 issues namely: (A) Known and followed, (B) Known but not followed, (C) Partially known and followed, (D) Partially known but not followed and (E) Unknown. Table-1 shows the part II of the questionnaire. In part III, respondents were requested to answer the 4 major questions on the criteria of skilled worker and the answer of the can be given in 2 different ways namely (F) Yes and (G) No. Table-2 represents the part III of the questionnaire. Table-1 and table-2 represent as an example of a surveyed questionnaire responded by a worker.

Table 1. Questionnaire part II

Questionnaire	Type of Answer				
	A	B	C	D	E

Topic	Known and followed	Known but not followed	Partially known and followed	Partially known but not followed	Unknown
Safety regulation			√		
BNBC regulation		√			
Labor Code				√	
Construction materials and related safety and other regulation					√
Equipment application procedure related safety and other regulation	√				

Table 2. Questionnaire part III

Questionnaire Topic	Type of Answer	
	F	G
	Yes	No
Work related training		√
Working experience (minimum 2 years)	√	
Physically up to date		√
Education (minimum class 5)		√

4. Data Collection

The necessary data were collected through the questionnaire survey among the construction workers by visiting construction site, labor union, labor welfare trust, government agencies and so on. A total 87 sets of questionnaire were distributed among the workers. Of the 87 sets of questionnaire, 71 sets were returned which is 82% of total distributed sets.

5. Data Analysis

Table-3 represents the demographic characteristics of the respondents.

Table 3. Demographic characteristics of respondents

Demographic Characteristics	Frequency	Percentage, %
Sex		
Male	52	73
Female	19	27
Age		
≤ 20 years old	15	21
21-30 years old	26	37
31-40 years old	17	24
≥ 40 years old	13	18
Location		
Dhaka Division		
Rajshahi and	18	25
Rangpur Division	11	15
Chittagong Division	13	18
Sylhet Division	8	11
Khulna and Barisal	21	31
Division		

Working Field		
Building	29	41
Infrastructure	20	28
Electrical and mechanical	14	20
others	8	11

The number of worker based on their way to answer of the question of questionnaire are categorized in five groups against each of the question in part II and two groups in part III of the questionnaire. The percentage of worker is calculated based on the severity of answer of the worker. The following equation is used to calculate the percentage of proportion of worker:

$$WP = \frac{A \times 100}{N}$$

In above equation ‘WP’ indicates the proportion of worker in percentage of ‘A’ type workers, ‘A’ represents the number of workers who give ‘A’ type answer of the questionnaire (in this study the answer is A, B, C, D, E, F and G type) and ‘N’ means total number of worker being surveyed for this study.

6. Result and Discussion

The actual situation against the 9 major criteria of skilled worker in construction sector is analyzed by the collected data through questionnaire survey. What number of workers have knowledge about various construction essentials and practice regulations in the working site is shown in the table-4 and table-5.

Table 4. Statistics of worker against skilled worker criteria at questionnaire part II

Question/Answer	Known and followed	Known but not followed	Partially known and followed	Partially known but not followed	Unknown
Safety regulation	9.35%	15.58%	2.80%	26.24%	46.03%
BNBC regulation	2.30%	5.88%	16.13%	20.08%	55.61%
Labor Code	4.87%	14.65%	2.50%	5.45%	72.53%
Construction materials and related safety and other regulation	6.45%	11.00%	24.93%	31.70%	25.92%
Equipment application procedure and related safety and other regulation	9.68%	23.43%	32.26%	7.55%	27.08%

Table 5. Statistics of worker against skilled worker criteria at questionnaire part III

Question/Answer	Yes	No
Work related training	6.45%	93.55%
Working experience (minimum 2 years)	62.50%	37.50%
Physically up to date	69.25%	30.75%
Education (minimum class 5)	46.06%	53.94%

Construction Safety

Construction safety is very important thing at present era. Construction safety is the principal concern in developed countries whereas in Bangladesh, no attention was drawn by the authority and worker in this regard. Construction safety regulation means the Occupational Safety and Health Administration

(OSHA), Bangladesh National Building Code (BNBC). Worker Safety regulation includes personal protective equipment and fall protection. For this safety hazard, hundreds of workers died and injured every year in Bangladesh because of accident in construction site (SRS, 2010, 2011, 2012, 2013, 2014, 2015). Construction accident decreases the productivity of workers, brings delays in construction delivery, increases the budgeted cost and affects the quality (Behm, 2005) (Dong, Entzel, Men, Chowdhury, & Schneider, 2004) (Mohamed, 2002). Figure-1 shows the actual current situation on the topic of construction safety among the workers.

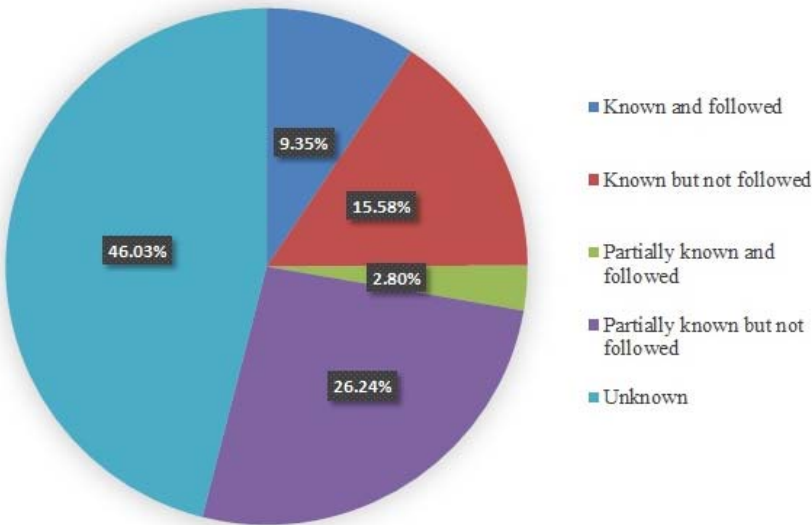


Figure 1. Proportion of worker based on the construction safety related criteria

Figure-1 shows that 9.35% of the workers properly know and 2.80% of the workers partially know the construction safety and both group of workers practice the regulation at working site. 15.58% of the workers know and 26.24% of workers partially know the regulation of construction safety but both the group don't follow and practice the regulation at working site. Almost half of the total workers and it's about 46.03% are not aware about construction safety

regulation and they don't take any safety measure during work.

BNBC Code

Bangladesh National Building Code (BNBC) is the only government issued regulation and guideline for the building construction sector. It contains constructional safety, quality of construction, environmental regulation for construction, worker wages and rights and others. So violation of BNBC turn the project into constructional accidents, quality hazards, workers conflict about wages and rights, negative impact on environment and so on (Ahmed, 2010) (Ahmed, 2010) (Rahman, 2012) (Shill, 2015) (Biswas). So, to know the BNBC properly and practice it at construction project is a precondition for the successful running of construction works in Bangladesh.

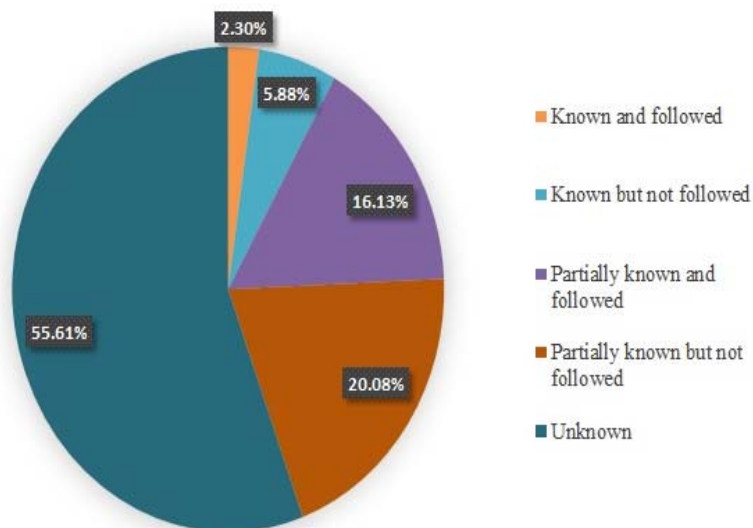


Figure 2. Proportion of worker based on the BNBC related criteria

Figure-2 indicates that more than half portion of the workers in construction sector don't know about the regulation and guideline of BNBC and the amount is 55.61%. Only 2.30% of workers know properly and 16.13% know partially and they follow and practice BNBC regulation and guideline at working site.

Other 5.88% of workers know and 20.08% of workers partially know the regulation and guideline of BNBC but they don't follow or practice at working site.

Labor Code

Most of the Bangladeshi construction worker are not aware about labor laws or labor code. They are not getting their wages according to the Labor Code and it is the main cause of strike by worker which brings loss of productivity and delays project completion (Fricker, 2003). In the case of accident, worker don't get proper compensation from the authority because of their ignorance of Labor Acts (Morrison & Robinson, 1997). All this things create negative impact on worker's mind and feeling .And this are the major causes of construction accidents, cost overrun and quality hazard (Josephson & Hammarlund, 1999).

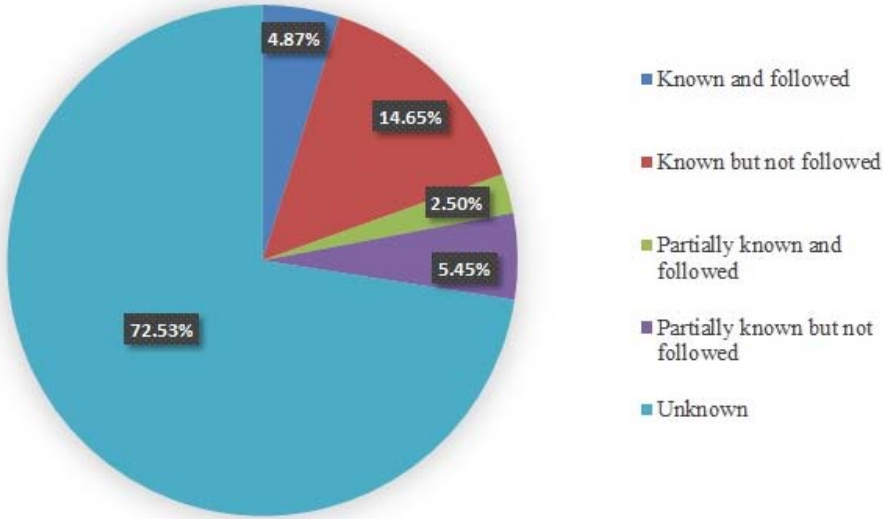


Figure 3. Proportion of worker based on the Labor Code related criteria

Figur-3 presents the proportion of worker at the study area in construction sector. A huge portion of construction worker and it's about 72.53% are totally unaware about the Labor Laws/Acts. And a little portion and it's only about

4.87% purely know and another 2.50% partially know and they follow the labor laws. Another 14.65% know and 5.45% partially know but they don't follow or practice labor laws at working site.

Construction Materials

Construction materials are the most importance and obvious things to complete the construction project. But most of the construction materials belong some demerits also. It is very necessary to know and understand all the material's properties. Some materials are chemically dangerous to worker. So, they have to take safety measure to work with that type of materials (Lingard & Rowlinson, 2005). Some construction materials have exploitation, burning, scratching, wounding and cutting characteristics (Domone & Illston, 2010). Proper proportion of some materials must be maintained unless the quality of work is hampered (Ramachandran, Paroli, Beaudoin, & Delgado, 2002) (Chen & Poon, 2009). So, knowing about construction materials, the construction waste reduce, reuse and recycling process is very important and effective (Peng, Scorpio, & Kibert, 1997) (Esin & Cosgun, 2007). All the cases lead a construction project into accident, safety hazards, quality issues, cost overrun and construction delays and other complex situations.

Figure-4 indicates that 6.45% workers purely know and 24.93% workers partially know about construction material and related safety issues and they follow and practice at workplace. A quarter portion and it's about 25.92% construction workers totally unaware about material and related regulation. Rest 11.00% know well and 31.70% partially know but both groups do not follow or practice the regulation.

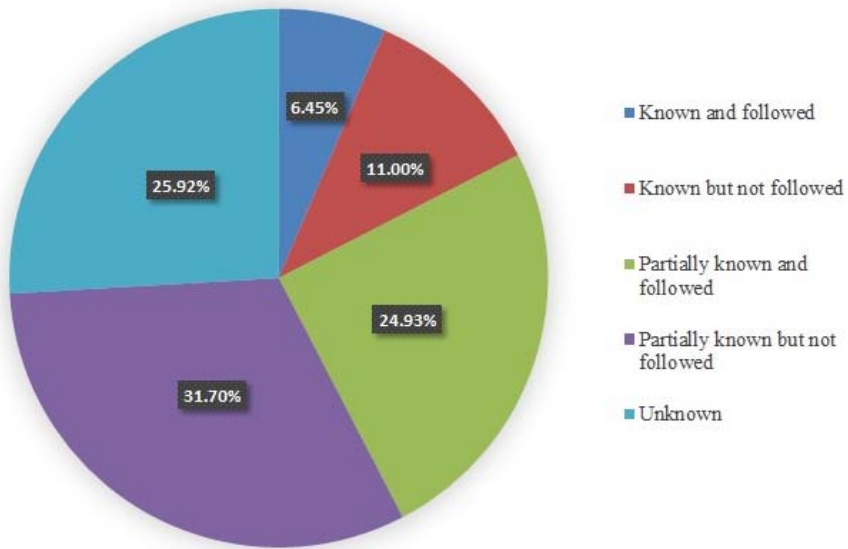


Figure 4. Proportion of worker based on the construction materials related criteria

Construction Equipment and Tools

Construction equipment and tools are the possible source of safety hazards and quality issues in construction projects (Haslam et al., 2005) (Burati Jr, Farrington, & Ledbetter, 1992). Each operator must have the training to operate safely and effectively (Gooch, 2011). Defaulted and poor maintained equipment and tools are the main factor of construction accidents and quality hazards (Hinze & Teizer, 2011). So it is very important to know about Construction equipment and tools and practically follow the related regulation to complete a project successfully.

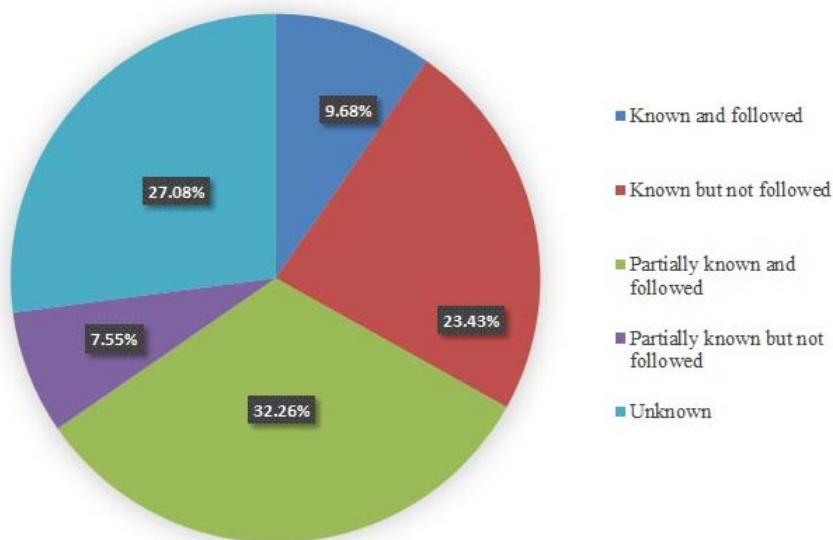


Figure 5. Proportion of worker based on the construction equipment and tools related criteria

Figure-5 indicates that 9.68% worker purely know and 32.26% worker partially know the related regulation and they follow and practice them at working site. Another 23.43% worker know and 7.55% worker partially know but they don't follow and practice at work site. And rest of the worker and it's about 27.08% are unaware of this criteria.

Work Related Training

Work related occupational training is a mandatory thing for any profession (Dong & Platner, 2004). But in Bangladesh, training of construction worker related to his work, is a night mere (Biswas). Training makes a worker expert at his work, teach him about health and safety issues, effective and safe procedures of work and increase his productivity (Tabassi & Bakar, 2009) (Aguinis & Kraiger, 2009). Figure-6 shows the actual situation of Bangladeshi construction workers in the question of occupational training.

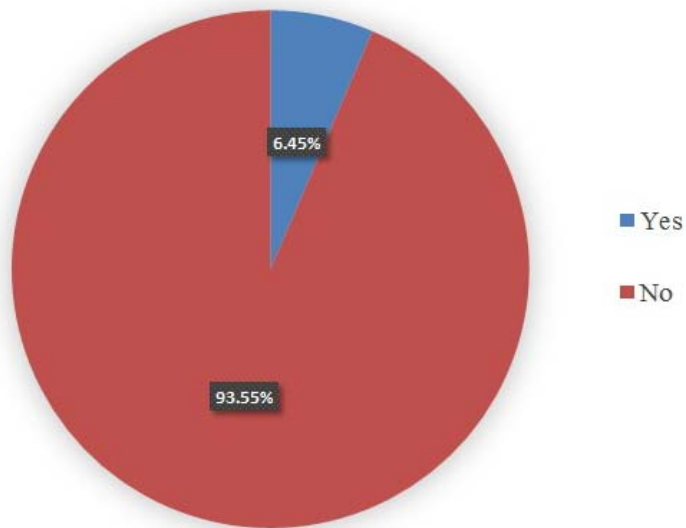


Figure 6. Proportion of worker based on the occupational training related criteria

Figure-6 indicates that only 6.45% of total construction worker get occupational training based on their work in Bangladesh. And rest of the worker and it's about 93.55% do not get any occupational training related to their work. This creates a negative impact on construction sector since last two decades and it's continue till now.

Working Experience

Working experience is very important to become a skilled worker. Working experience increase productivity of worker, reduce the rate of error in working procedure and make worker as essential asset to the company (Quiñones, Ford, & Teachout, 1995) (Avolio, Waldman, & McDaniel, 1990). So the minimum working experience is very importance to be a skilled worker.

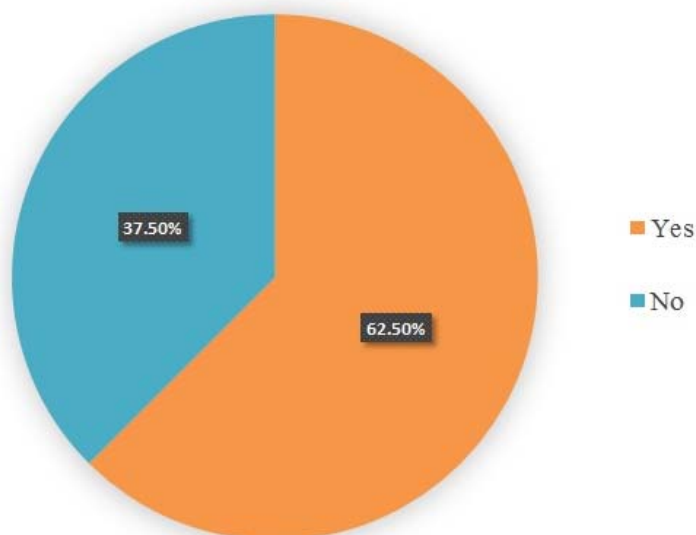


Figure 7. Proportion of worker based on the working experience related criteria

Figure-7 shows the proportion of construction worker who have minimum two year working experience or who don't have. A favorable amount of 62.50% worker have experience and another 37.50% worker don't have two year working experience.

Physically Up to Date

Physically up to date worker are the asset and main fuel of any industry including construction industry. A unhealthy worker working under stress and physical weakness create possibility of error judgment and wrong decision from him (Beehr & Newman, 1978). This scenario is the major cause of construction accident, construction delays, quality issues, cost overrun and increase the project complexity.

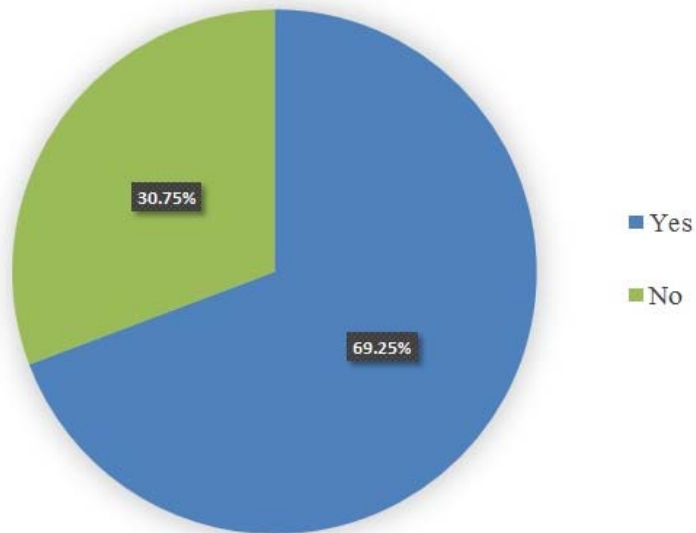


Figure 8. Proportion of worker based on the physically sound criteria

From figure-8 it's been seen that 69.25% worker are physically up to date and the other 30.75% worker are somehow found unhealthy or sick. One third portion of worker are not sound to carry out his work.

Education

A minimum level of education is necessary to be a skilled worker. The minimum level is determined as class five for Bangladeshi worker. Educated worker can easily understand his job and give the best output (Fershtman & Weiss, 1993). They are more productive, aware of health and safety issues, able to take effective decision which turn a project into a successful one (Drucker, 1999). So it is a very important for a worker to have minimum level of education. Figure-9 shows the educational level of worker of construction sector in Bangladesh.

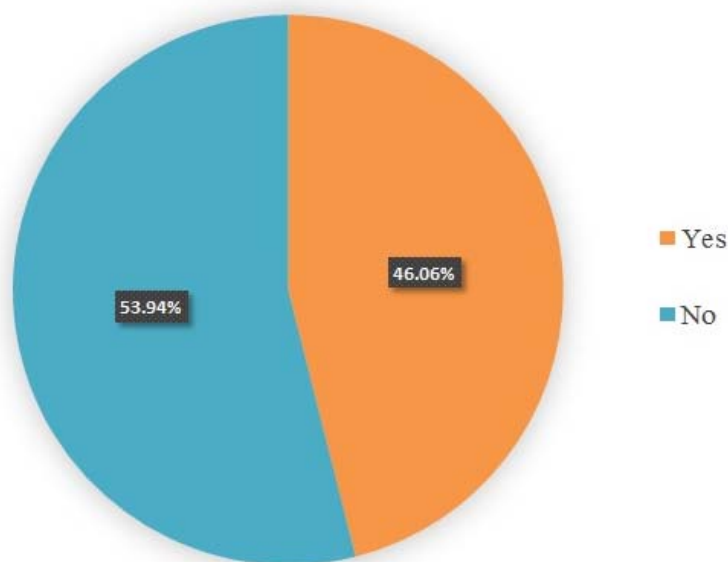


Figure 9. Proportion of worker based on the education related criteria

Figure-8 indicates that only 46.06% worker have educational level up to class five and other 53.94% worker's education level is less than class five.

7. Conclusion and Recommendation

The study was conducted by comprehensive literature review and questionnaire survey. Essential information and data were collected through questionnaire survey. The study identify 9 major criteria of skilled worker in 2 groups. The first group of questionnaire was analyzed in 5 different ways and other group of questionnaire was in 2 different ways. A total 87 sets of questionnaire were distributed among the construction worker across the country and 71 sets were returned.

Almost half of the total worker are unaware of construction safety measure and they are falling into accident every day at a high rate. Some portion of worker know but don't follow the regulation and guideline. To improve this situation, necessary step should be taken to provide with proper training by the authority. Authority should make arrangement for giving basic idea of safety

measure, health and hygiene, risk management and other fundamental issues of construction sector. A huge portion, more than half of construction worker in Bangladesh, are not known to the BNBC and Labor Laws and the other small portion who are known to the code and laws, don't follow and practice them at working site. Seminar, symposium and training program should be provided for the worker for their learning and fulfilling the criteria widely. Governmental agencies and Bangladesh Employers Federation have to be strict to implement their regulation at every construction project. Around one-fourth of construction worker are unaware of construction material and construction equipment and tools. Half of the worker know completely or partially but don't follow the guidelines and don't practice them at working field. Training for worker have to be arranged to provide opportunity to the worker to learn and to be expert at his work. Technical supervisors is necessary at working place to guided and monitor them during working period. And it's an effective way to improve level of expertise and skill of worker. An effective supervision and auditing system is necessary to monitor and control the construction worker at working field and turn them into skilled worker.

Other criteria of skilled worker are described at part III of questionnaire. Almost all the worker of construction sector in Bangladesh don't have occupational training. A few workers get training based on working field but is in the worst condition. Authority should understand the benefits of trained worker and bad effects of untrained worker on the project. They should provide effective training program to their worker. Minimum working experience and minimum level of education are the key factors of skilled worker. Around half of the construction worker don' have minimum working experience and minimum level of education. Authority should not give the position to an inexperience worker until he become an expert. Government must take step to educate all people at a minimum level. Another criteria is physically up to date worker and they are the heart of construction industry. A big portion of workers are found sound to work by the study. Rest of the worker are found unsound for

working during the were surveyed. Authority should give attention to take care of their unsound and sick worker providing first aid, medical treatment and consultancy and psychological counseling. Also it is important to provide to them special leaves and momentary allowance for medical purpose.

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