

# ***DRAFT WHITE PAPER on 'HUMAN CAPITAL (INCLUDING LABOUR, TECHNICAL & MANAGERIAL, AND SKILLS DEVELOPMENT) AND PRODUCTIVITY'***

- Ci3 (Construction Industry Institute India) Action Team 5 – June 2017

[Note: **Ci3** (Construction Industry Institute India) replaces Ci3 *India* (Construction Industry Initiative *India*)]

## **1. INTRODUCTION**

### **1.1 FOCUS OF THE ACTION TEAM**

Action Team 5 - “Human Capital (including Labour, Technical & Managerial, and Skills Development) and Productivity” was formulated to study the following six issues which are among the 19 current and imminent critical issues in the Indian construction industry as identified and validated in the first phase of Ci3 (First and Second Regional Roundtables):

- Low productivity
- Acute shortage of skilled workmen
- Lack of proper facilities for workers
- Need for up-skilling construction professionals
- Inadequate quality
- Lack of productivity benchmarks and standards

### **1.2 INDUSTRY SCOPE, LOW PRODUCTIVITY, TIME-COST OVER-RUN PARADIGM:**

The last two decades have seen the Indian economy grow significantly. India's GDP crossed the US\$ 2 trillion mark in 2014. It is estimated that about 10% of India's GDP is based on construction activity. This sector accounts for second highest inflow of Foreign Direct Investment (FDI) in India. The construction sector employs approximately 35 million people. Large investments are being made in housing, commercial, industrial and infrastructure sectors (Make in India 2015). However, the construction projects in India are facing key challenges such as time and cost overruns, low-productivity and lack of skilled labour.

Among the numerous factors that influence the outcome of a construction project, productivity is one of the major factors. Since many of the construction activities are labour-intensive, construction productivity is influenced by the effective and efficient use of labour resources. Labour generally costs make-up 30% to 50% of overall project cost (Harmon and Cole 2006). Evidence from relevant literature also shows that poor labour productivity has been identified as a major factor causing a delay in Indian construction projects (Doloi et al. 2012). A report of the National Commission on Labour, Govt. of India (2002) also reported that the industry functions at low productivity because of lack of skills, poor workmanship, low levels of mechanization and technology adoption.

### **1.3 LABOUR-RELATED ISSUES**

From Fig. 1. one can infer that the current skilled worker employment is 3.3 million with a need for seven fold increase in next five years, and the shortage of skilled labour is a causative factor for lower productivity as sites, project over run.

The following table shows the requirement of Human Resource for Construction ( 2022) as per approach plan 2012 by National skill development council.

Type of Manpower	Required man years
1.Engineer	3.72 million man years
2.Technician	4.32 million man years
3. Support staff	3.65 million man years
4.Skilled worker	23.35 million man years
5.Unskilled/ semi-skilled worker	56.96 million man years
<b>TOTAL MANPOWER</b>	<b>92 million man years</b>

Present condition :

Category	Percentage of Employment	Total Employment
Unskilled workers	83%	25.6 million
Skilled workers	10%	3.3 million
Engineers	3%	0.8 million
Technicians and foremen	2%	0.6 million
Clerical	2%	0.7 million

Table-2

**Fig. 1.** Requirement of human resource for construction in 2022

A recent research study by IIT Madras indicated that the average construction worker age is 28 years. From a sample of about 1200 construction workers across five different projects in the country, it was found that about 16% of the workers are under 20 years, 51% are under 25 years, 69% are under 30 years, and 81% are under 35 years of age indicating absence of experienced, skilled workers (Loganathan and Kalidindi, 2016)

Construction work is seen as a 'part-time,' unskilled profession instead of a skilled, long-term career thereby leading to exit from the industry.

### **1.3 CONSTRUCTION PROFESSIONALS-RELATED ISSUES**

Construction professionals face high levels of stress when compared to professionals in any other industry (Sutherland and Davidson, 1993; Sommerville and Langford, 1994). It is due to the nature of the work and characteristics of the construction industry such as, the male dominated industry promotes competitiveness and conflict (Sutherland and Davidson, 1993), one-off type production requires high level of coordination and specialist input and poor on-site working conditions can lead to quality and safety problems being experienced by the employees. According to a report from the Chartered Institute of Building, the United Kingdom construction professionals were increasingly viewing their work as being stressful (Campbell, 2006). To complete a project on time, to the desired quality and within budget, as well as to satisfy a wide range of stakeholders which are often conflicting can subject a project manager to on the job pressures that manifests as stress (Haynes and Love, 2004a).

Hence it is evident that work stress is a major threat to the attainment of sustainable growth in the construction industry in particular and economic development of any nation in general. There are several studies on the construction industry which focus on occupational stress in the western context. However, there are limited studies on occupational stress in the Indian context. Given this, there is a need to understand the issues related to construction professionals.

### **1.5 OBJECTIVES**

- A. To identify the critical labour-related and construction professionals-related issues in the Indian construction through exploratory research studies

- B. To suggest measures, and appropriate policy recommendations to construction organisations to mitigate such issues.

## **2. METHODOLOGY**

At the first instance, literature study was conducted to understand the issues with the management of construction workers and the issues related to construction professionals in the Indian context. Following the literature study, the Action Team members have subsequent Conference-calls for Joint brainstorming to propose the various Action Agendas.

The Action Team adapted inputs from two recent research studies which are jointly carried out in collaboration with IIT Madras. Research study-1 was a combination of exploratory survey and case studies studying the issues related to construction workers. Research study-2 was focussed on studying the potential work related stressors and organisation related stressors among construction professionals. For the sake of brevity, review of relevant literature, detailed explanation of the studies are not discussed here. However, part of research study-1 has been published elsewhere (Loganathan and Kalidindi, 2016).

## **3. RESULTS AND DISCUSSION**

### **3.1 RESEARCH STUDY-1**

#### **3.1.1 EXPLORATORY SURVEY**

As mentioned earlier, Research study-1 was focussed on labour-related issues. Research study-1 has two parts. Part-1 is an exploratory survey to study the demographic profile of Indian construction workers and their organization in the construction projects. As the anecdotal evidence indicate that a high transition in the demographics of construction workers in seen in India over the last 10 – 15 years, the exploratory survey was conducted to empirically verify the anecdotal evidence.

The data collection in the exploratory survey was divided into two parts. The first part of the data collection includes a collection of general project data such as project location, type, cost, duration, etc. This was collected from the planning department of the project sites. A total of 15 construction projects were surveyed, which includes 14 building projects and a metro rail project from six different states of the country. The 14 building projects include nine residential, two hospital, two commercial and one institutional projects. Details of the projects surveyed and workers are given in Table. 1. The 15 projects were executed by nine contracting companies. Duration of the projects surveyed ranges from 18 months to 48 months, with an average of 26 months. The cost of the projects surveyed ranges from INR 200 million to INR 10530 million, with an average of INR 2210 million.

All the projects studied, followed six work days per week (from Monday to Saturday), with one to two work shifts per day (8:00 am to 5:00 pm, and 6:00 pm to 2:00 am), and eight hours per work shift. Also, in all the projects studied an over-time of two to four hours was generally followed.

**Table.1.** Details of the projects surveyed

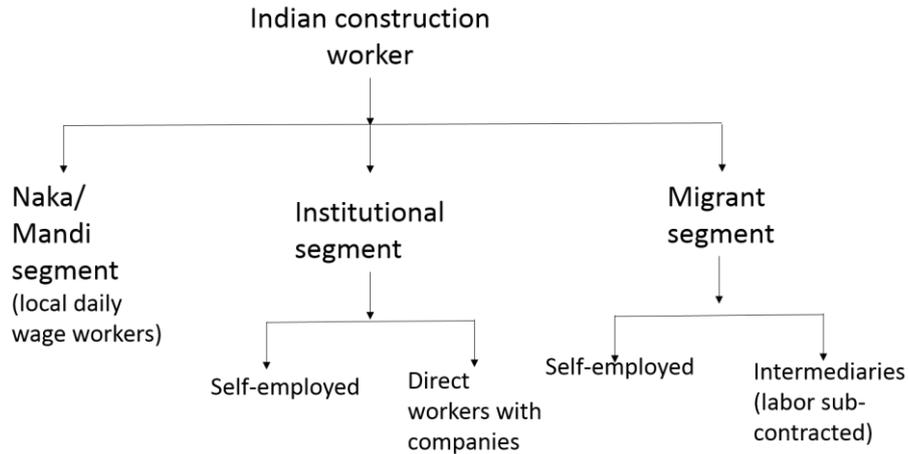
S. No.	Project type and location	Project code	Duration (in months)	No. of workers at site on date of survey		Percent -age of migrant workers
				In-house workers	Sub-contract workers	
1	Residential, Bangalore	RB1	26	80	650	95
2	Commercial, Chennai	CC1	24	20	1180	90
3	Hospital, Chennai	HC1	18	20	65	95
4	Residential, Chennai	RC1	30	50	950	90
5	Residential, Chennai	RC2	21	57	1100	95
6	Residential, Chennai	RC3	20	45	330	85
7	Residential, Chennai	RC4	24	45	150	95
8	Residential, Chennai	RC5	36	50	650	95
9	Metro rail, Delhi	MD1	27	600	1600	90
10	Commercial, Erode	CE1	24	20	150	95
11	Residential, Mumbai	RM1	48	102	800	90
12	Residential, Mumbai	RM2	27	500	1500	65
13	Residential, Mumbai	RM3	27	20	250	90
14	Institutional, Pondicherry	IP1	24	35	230	80
15	Hospital, Vadnagar	HV1	18	30	250	85

The second part of the data collection covered the collection of information related to migrant construction workers. In all the projects studied, the contractors engaged both in-house and labour sub-contractor workers in their projects. The proportion of in-house and labour sub-contract workers in the projects studied are given in Table 1. At an average, the percentage of in-house and labour sub-contract workers engaged in all the projects studied is about 15% and 85% respectively.

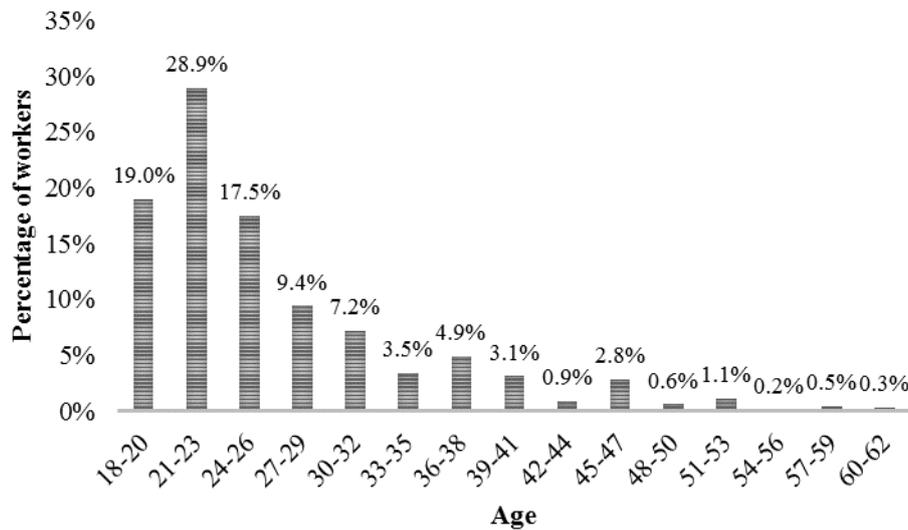
Labour sub-contractors engage significantly large proportion of migrant construction workers. In the projects studied, the percentage of migrant construction workers ranges from 65% to 95%, at an average of 89% of the total workforce engaged in the projects. The majority of the migrant workers were from the states of West Bengal, Bihar, Odisha, Uttar Pradesh,

Jharkhand, Andhra Pradesh, Telangana, and Assam. The categorization of construction workers in India is represented in Fig.2.

In response to the anecdotal evidence which says that most of the construction workers are young males, data from the projects studied show that age of the construction workers ranges from 18 to 60 years with a high proportion of them being less than 30 years. Fig. 3. shows the age distribution of construction workers in one of the projects surveyed (Project-CC1). It was found that about 68% of the workers are under 26 years, and 89% are under 35 years of age.



**Fig. 2.** Categorization of construction workers in India



**Fig. 3.** Age distribution of construction workers in one of the surveyed projects

The survey conducted also explored the causes for absenteeism and turnover of construction workers as it is widely opionated that absenteeism and turnover of construction workers significantly affect construction productivity. Absenteeism and turnover were also identified as the key factors causing productivity variation in the exploratory case study.

### ***Reasons for absenteeism and turnover as reported by managers and labour sub-contractors***

Interviews with managers and labour sub-contractors were conducted to explore the potential causes of high absenteeism and turnover of migrant construction workers in the 15 projects studied. A total of 17 managers were interviewed, which includes five general managers, eight project managers, and four planning managers. The average experience of the managers interviewed was 18 years. A total of 19 labour sub-contractors were interviewed, which includes six formwork carpentry, six bar-bending, and seven masonry construction labour sub-contractors.

Illness, improper basic facilities, injury, lack of rest, payment delays, improper work front, inadequate tools, alcoholism, festival and harvest season, extreme season, relocation of crew members, sharing of resources, disengagement with other crews, relationship with other crews are the reasons explored for absenteeism of workers.

Payment delays, lack of basic facilities, rate variation, improper arrangement and shifting of materials, improper work front, excessive rework, sharing of resources, better wages elsewhere, excess travel from shed to site, work available near their hometown, festival and harvest season, inconsistent work methodology, poor performance of crews, relationship with other crews are the reasons explored for high turnover of workers.

### **3.1.2 EXPLORATORY CASE STUDIES**

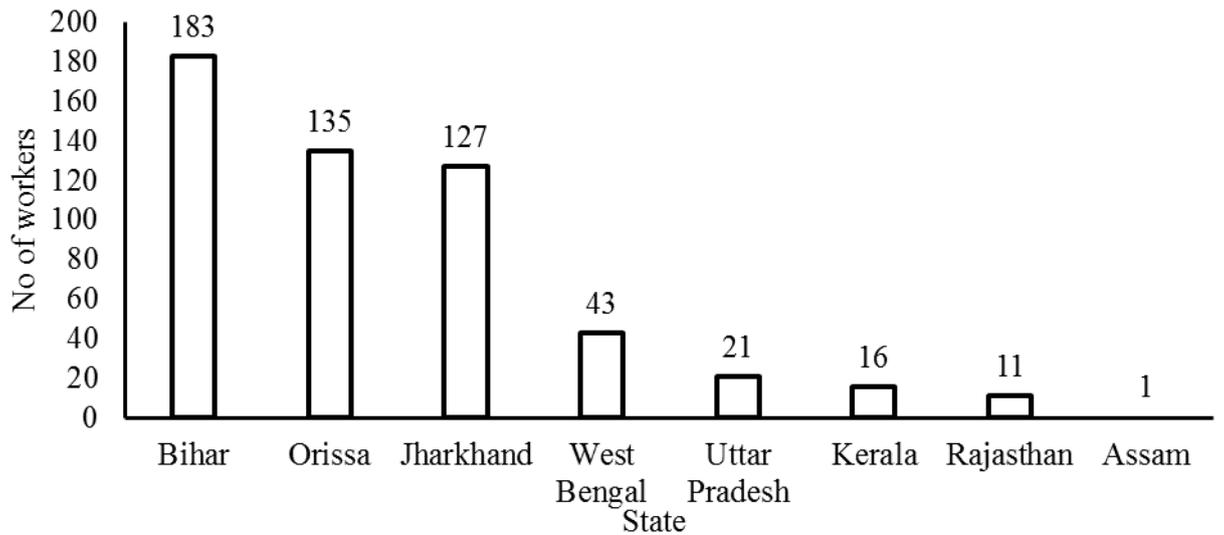
The second part of Research study-1 was conducted in two other different projects to understand the labour-related issues from the perspective of worker. The two projects are chosen in a way that one project has better labour management practices (relatively best in the industry) compared to the other project.

### ***Demographic profile of construction workers in the projects***

As mentioned earlier, the Indian construction involves a significant percentage of migrant workers. In Project-1, a sample of 537 workers and in Project-2, a sample of 2030 workers were analysed. Table. 2 and Table. 3. indicates the percentage migrant construction workers in Project-1 and Project-2. Figure. 4 and Figure. 5 shows the pictorial representation of the same.

**Table. 2.** Percentage of migrant construction from different states in Project-1

<b>State</b>	<b>No of workers</b>	<b>Percentage</b>
Bihar	183	34.1
Orissa	135	25.1
Jharkhand	127	23.6
West Bengal	43	8.0
Uttar Pradesh	21	3.9
Kerala	16	3.0
Rajasthan	11	2.0

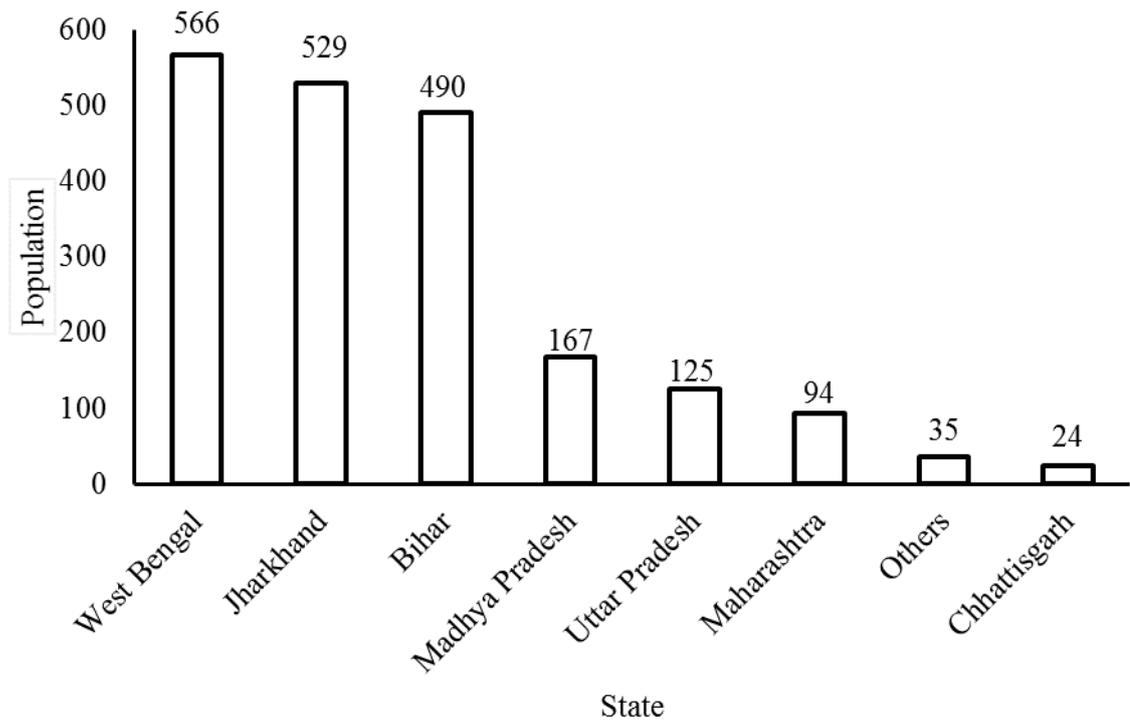


**Fig. 4.** Share of migrant construction from different states in Project-1

From Table. 2 and Figure. 4 it is noted that the top three states are Bihar, Orrisa, and Jharkhand. The total share of these states is 83%.

**Table. 3.** Percentage of migrant construction from different states in Project-2

State	No of workers	Percentage
West Bengal	566	27.88
Jharkhand	529	26.06
Bihar	490	24.14
Madhya Pradesh	167	8.23
Uttar Pradesh	125	6.16
Maharashtra	94	4.63
Others	35	1.72
Chhattisgarh	24	1.18

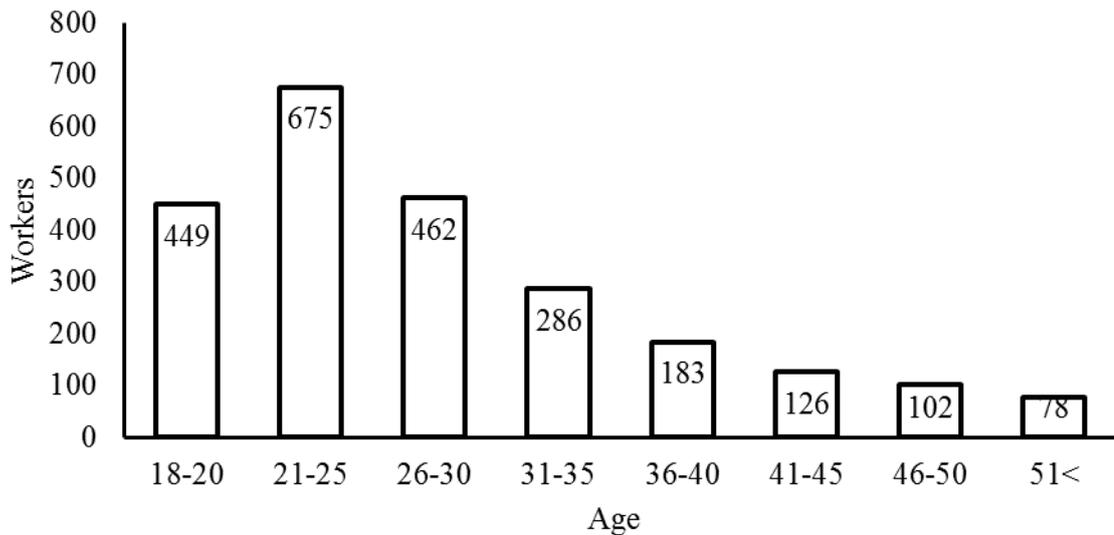


**Fig. 5.** Share of migrant construction from different states in Project-2

From Table. 3 and Figure. 5. It can be inferred that the top three states are West Bengal, Jharkhand, and Bihar. The total share of these states is 78%. Considering both the two projects, Bihar, Jharkhand and West Bengal makes a significant portion of migrant construction workers.

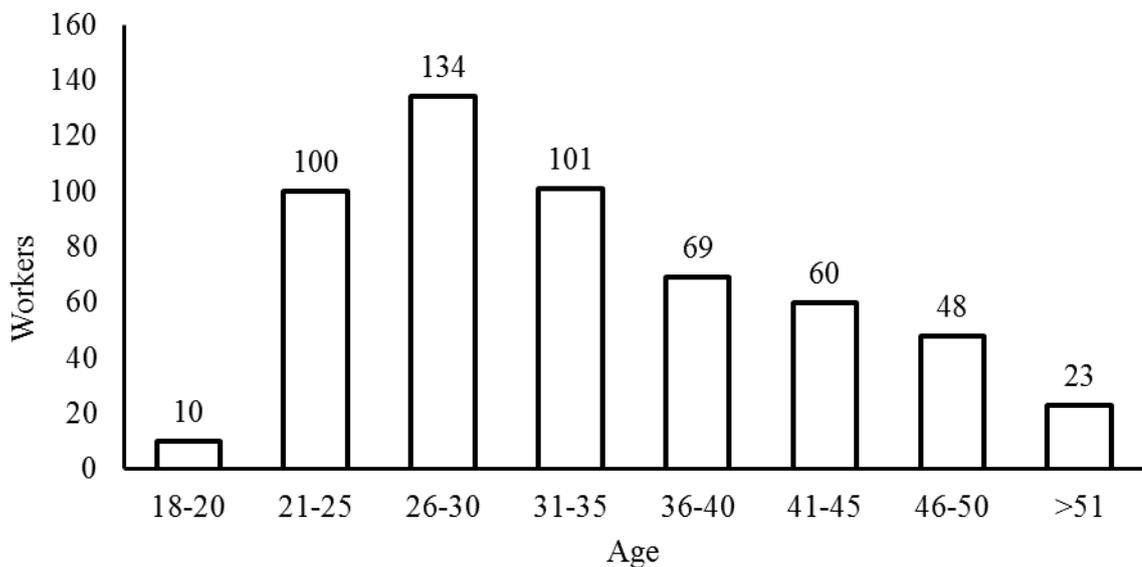
### ***Age distribution***

Analysis of the collected age data from two projects indicates that in Project-1, 50% of the workers are between 18 and 26 (median=26) and 75% of the workers are below 33 years. The average age of construction worker is 28 years. Figure. 6. shows the overall age distribution. The highest number of workers belongs to the category 21-25 years (29%).



**Fig. 6.** Age distribution of construction workers in Project-1

On the other hand, in Project-2, the highest number of workers belong to the group 26-30 years. The average age of the workers is 33 years. Figure. 7. shows the overall age distribution of Project-2.



**Fig. 7.** Age distribution of construction workers in Project-2

### ***Labour camp facilities***

A questionnaire survey was conducted with the construction workers to rate their labour camp facilities. The survey was conducted among 50 construction workers in each project. The workers were asked to respond on a scale of 1-3 with 1 indicating as “Excellent”; 2 indicating as “Satisfactory” and 3 indicating as “Not good” regarding the facilities in the labour camp of the two projects. Table. 4. shows the results of the survey. Table. 4. shows the percentage responded for each category in the respective projects by the workers.

**Table. 4.** Survey response regarding the labour camp facilities in the projects

Criteria	Project-1			Project-2		
	Excellent (in %)	Satisfactory (in %)	Not Good (in %)	Excellent (in %)	Satisfactory (in %)	Not Good (in %)
Roof material	10	60	30	32	58	10
Mattress	9	66	25	17	71	12
Drinking water	13	69	18	72	28	0
Toilet facilities	8	36	56	19	57	24
Food	14	56	30	56	44	0
Transportation	24	71	5	22	68	10
Overall Hygiene	38	51	11	12	58	30
Safety	88	10	2	38	55	7

As can be inferred from Table. 4. that Project-2 have better labour camp facilities compared to Project-1. The roof material in Project-1 was tin shed, which is not accommodative in both summer and winter climates, whereas the roof material in Project-2 was the temporary concrete roof which is better than the tin. Both sites have the double-decker cot, but the cots in Project-2 were wider and maintained well. Drinking water in Project-2 was available very near to the camp entrance, and water coolers are provided in the summer whereas in Project-1 drinking water was provided in water cans. Toilets were maintained well in Project-2 however not so maintained well in Project-1.

### **3.2 RESEARCH STUDY-2**

#### **3.2.1 BACKGROUND REVIEW**

In the construction industry, various work related factors and organization related factors can manifest occupational stress at the professional level. In several occupations the nature of work itself can be stressful such as work overload (Frone et al., 1997; Sparks and Cooper, 1999; Taylor et al., 1997) and role-based factors such as lack of power, role ambiguity, and role conflict (Burke, 1988; Nelson and Burke, 2000). The literature suggests that the job satisfaction and work life balance is related to the work related factors, organization related factors, and environment related factors. For example, work overloads (Caven and Raiden, 2010), unsatisfied with salary (Lingard and Sublet, 2002), inadequate knowledge of project objective (Leung et al., 2008). Lyne et al. (2000) outline a model suggesting that the same workplace factors are expected to impact on job satisfaction and as do on stress. An employer can build employee job satisfaction by offer better work life balance so that employees can balance the

needs of their work with other aspects of life (Messmer, 2005). Thus work related factors and organisation related factors have strong impact on work life balance and job satisfaction.

Accordingly, the objective of this study was to study the potential work related stressors and organisation stressors. Also the relationship with work life balance components and job satisfaction. The mediating relationship has also been verified. The population of the study is construction professionals such as construction project managers, site engineers and project engineers among Indian construction organizations. A total of 285 samples has been taken for the study. Thus a cross sectional survey research based research methodology is adopted for the study. Multiple regression analysis, exploratory factor analysis, one-way Anova test and independent t- test has been used for data analysis.

### **3.2.2 RESULTS AND DISCUSSIONS**

The findings reveal that long working hours are the major problem in the Indian construction industry. It has been identified that 61.2% of construction professionals are working more than 71 hours per week in which construction managers are working 75 hours per week. Thus work time related stressors are major source of occupational stress. There are five major stressors which contribute to high levels of occupational stress in the construction industry, which is, 'Job nature demands coordination with multiple stake holders,' 'Tight time frame for work,' 'Unstable working hours,' 'Bureaucracy' and 'Quantitative workload.' Out of five major stressors, three stressors are work time related stressors.

Construction professionals perceive high work interference to family life and less work enhancement of personal life. Employees' personal factors (age, industrial experience, qualification and spouse employment) are not playing any significant role in managing work life balance. This clearly indicates that work and organisation factors play major role in managing work life balance when compared to personal demographic factors. However, married employees perceive high work interference to personal life and less work enhancement of personal life when compared to unmarried employees. Thus employees marital status play major role in managing their work life balance. Overall construction professional perceives better job satisfaction. However, employees perceive the different level of job satisfaction based on the projects they work in. Construction professional who are working roads and infrastructure projects perceive less job satisfaction when compared to the professional who is working on other projects. Similarly, construction professionals who are working in rural projects perceive less job satisfaction when compared to the professional working in urban projects and semi urban projects.

Age and industrial experience play a major role in perceiving occupational stress due to work and organisational related factors. Employees who have less experience perceive a high level of occupational stress due to work and organisation related factors. Specifically, work time related stressors such as long working hours and unstable working hours, work nature related stressors such as coordination with different people and work overload, organisation policy related stressors such as bureaucratic nature of the organisation and change in job nature. Also, site engineers perceive a high level of occupational stress when compared to project managers and project engineers.

Work time stressors are a strong predictor of work interference to personal life and work / personal life enhancement. There is a significant relationship between work time stressors such as unstable working hours, tight time frame for work and work over load and work interference with personal life. Similarly, work nature related stressors are strong predictors of work life balance components. Organisation policy related stressors such as bureaucratic nature of organisation and adaptability problem with changing job nature are a significant predictor of work life balance components. Organisation position stressors such as inadequate authority for decision making and unsatisfied salary are significant predictor of work life balance of the professionals.

Work related stressors and organisation related stressors have strong positive relationship with work interference to personal life and personal life interference to work. On the contrary, work related stressors and organisation related stressors have strong negative relationship with work life balance and job satisfaction. Thus, work stressors and organisation stressors are significant predictors of work life balance and job satisfaction, whereas there is no significant relationship between work stressors and organisation stressors and work / personal life enhancement. Organizations needs to develop policies which address the issues of work time related problems and work life balance, in order to safeguard the employees from adverse family outcomes associated with long working hours and job demands.

Work interference with personal life significantly mediates the relationship between work time stressors and job satisfaction. Work interference with personal life significantly mediates the relationship between organisation position stressors and job satisfaction.

Personal life interference to work is not significantly mediating the relationship between work stressor and job satisfaction. Personal life interference to work is not significantly mediating the relationship between organisation stressor and job satisfaction.

#### **4. SUGGESTED WAYS FORWARD AND FUTURE WORK WITH POINTERS**

##### **4.1 LABOUR-RELATED ISSUES SUGGESTED WAYS FORWARD AND FUTURE WORK**

The following were possible discussion themes that emerged out of the issues brought by research:

##### **4.1.1 QUASI-FORMALIZATION OF WORKFORCE – ESTABLISHING A BUSINESS CASE:**

*Quasi-Formalization of the workforce* would refer to ‘*Monitoring but Not Managing model*’ of workforce management where the Principal Employers start ‘monitoring’ wages being disbursed till the last mile in addition to the currently outsourced model. Thus, they retain the basic tenet of current working with an additional tweak to safeguard labour welfare norms that in any case are legally binding upon the Developers/business owners as ‘Principal Employers.’ Over time, monthly wage payment model could also be adopted. There is a need for establishing the business case for significantly increasing the proportion of semi-formal workers in a construction project is very crucial. This will address some of the top attrition and absenteeism causing factors as described at the end of section 3.1.1.

## ***Recommendations***

***Thus following initiatives for ‘Quasi-formalization’ of the workforce were suggested could be started in ‘Demo-project sites’:***

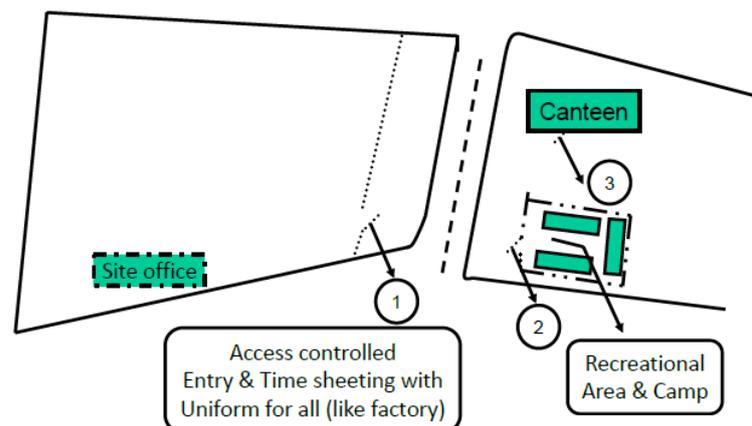
- i) Mandatory digital bank account wage- payments for monitoring actual wages to last-mile-sub-contracted workers. This will also ensure timely disbursement of wages thus fulfilling labour laws’ mandate for the Principal employer.
- ii) Provision of ‘Site-id’ with access control-based attendance to digitally log attendance to be used for time-sheets of wage/OT calculations. This will enable in the actual head count and fair Wage/Overtime calculations without ‘inflated’ headcount claims from sub-contractors.

### **4.1.2 MAKING CONSTRUCTION ‘SECTOR’ ASPIRATIONAL – BRINGING IN MANUFACTURING LIKE CULTURE:**

The aspiration of most rural Indian youth is now for ‘decent work conditions, good treatment, respect and the potential for advancement’ in addition to pay/ wage considerations. Thus, investing in basic accommodation, food and travel facilities (if need be on deductible basis) like in the Middle-East countries would yield worthwhile dividends.

As can be seen in the above the analysis, illness, Lack of Basic Facilities and Injury are some of the high reasons for attrition. There is a need for bringing ‘Manufacturing’ like culture in to the construction sector. There is need to improve the overall construction industry image and make it attractive for all talent pool sat entry-level as well as for career development.

An example could be a ‘centralized’ kitchen and access controlled Entry & Time sheeting with uniforms for all as shown in Fig. 8.



**Fig. 8.** Facilities for workers at site

The Qatar Foundation has given welfare guidelines as part of the mandatory standards and is attracting a skilled workforce from the Indian sub-continent.

## ***Recommendations***

***Making construction sector ‘aspirational’ for workers.*** The construction industry, unlike the manufacturing industry has not the same sense of ‘aspiration’ from a professional perspective. The following initiatives can be piloted:

- i. Uniforms like ‘over-alls’ for all site-workers (to be issued along with helmets, shoes) to ensure a ‘factory-like’ environment at construction site***
- ii. Weather-resistant accommodation (using pre-fab materials like Bison boards), along with on-site canteen, Entertainment, bus-travel facility (to be provided if need be on deductible basis) like in the Middle East.***

### **4.1.3 INCREASING FORMALLY TRAINED PERSONNEL AS % OF TOTAL SITE WORKFORCE AND MEASURING THE IMPACT ON PRODUCTIVITY/OUT TURN:**

As mentioned earlier, a research study by IIT Madras indicated that the average construction worker age is 28 years (Loganathan and Kalidindi, 2016). Construction work is seen as a ‘part-time,’ unskilled profession instead of a skilled, long-term career thereby leading to exit from the industry.

Given the impending demand of skilled workforce and sectoral growth, attracting and retaining talent at all levels from entry-level onwards is critical. Thus, we need to revisit the popular paradigm of construction manpower requirements being ‘project-based,’ from an organizational perspective that aims for an adequate pipeline of projects to move manpower from one project to another within the organization. Thus metrics like % formally trained and certified workforce should be mandated during the tendering and contract finalization stages and closely monitored for compliance. There is a need to Set stage-wise targets for mandating the proportion of trained and certified direct/ formal workers in a construction project e.g. from 15 % in 2 years to 25% in 4 years.

***Need for skilled, retained work force: The Traditional Argument – ‘Cyclical Industry of Real Estate & Construction’ – New Zealand scenario:***

#### ***NZ case study:***

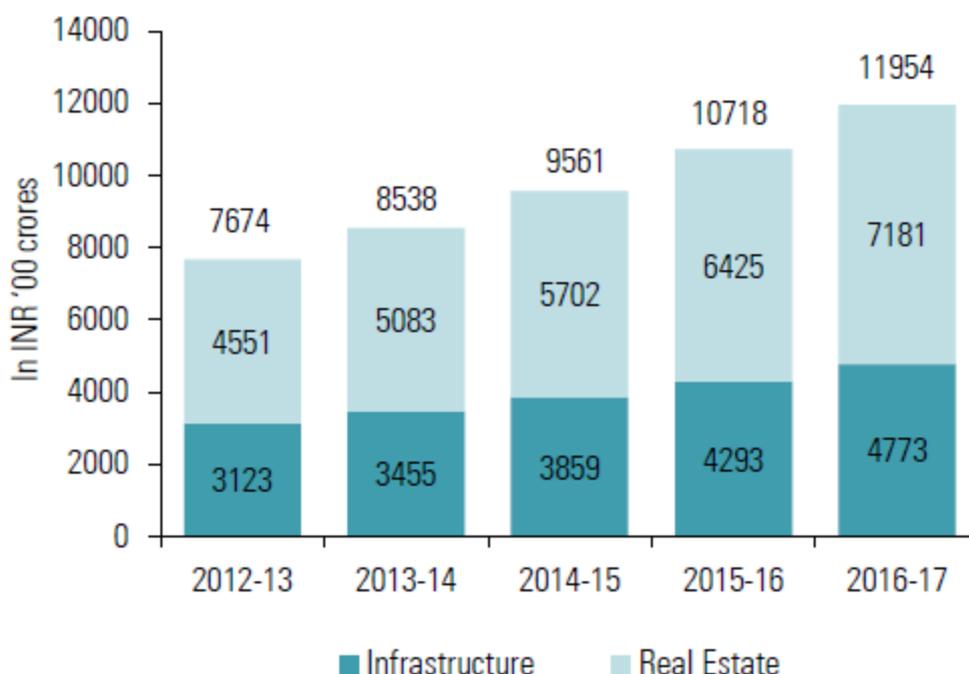
- “One key issue that was repeatedly emphasised in the literature is the seasonality of the skill base and the adequacy of skill levels of personnel in the construction industry.***
- The pool of experienced and skilled personnel changes drastically by underlying economic conditions, i.e. during the boom period, employment in construction tends to grow exceptionally high (mainly in the unskilled occupation categories) while during slow periods, the reverse is true (Allan et al., 2008; DOL, 2009).***
- This fluctuation in labour availability makes it hard for firms in the NZ construction industry to operate efficiently as they tend to experience skill shortages during prosperous periods but difficulties to hold on to their experienced staff in hard times due to the availability of work and to each firm's financial health.***

- *The direct consequence of this is in the performance of labour productivity, where it tends to exhibit a choppy behaviour as observed. It can be argued that a well-equipped skilled workforce may be a backbone for any future growth in labour productivity if the industry decides to take actions to mitigate this chronic problem. Hence, research is required in to the relationship between skills and productivity in NZ construction”*

The traditional argument laid down in the construction industry is of it ‘being cyclical in nature’ and ‘project based.’ However, if there are continuous growth trend and pipeline of projects, the need for skilled manpower is constant.

**Indian Scenario – A growing industry which is relatively stable over time (NSDC report):**

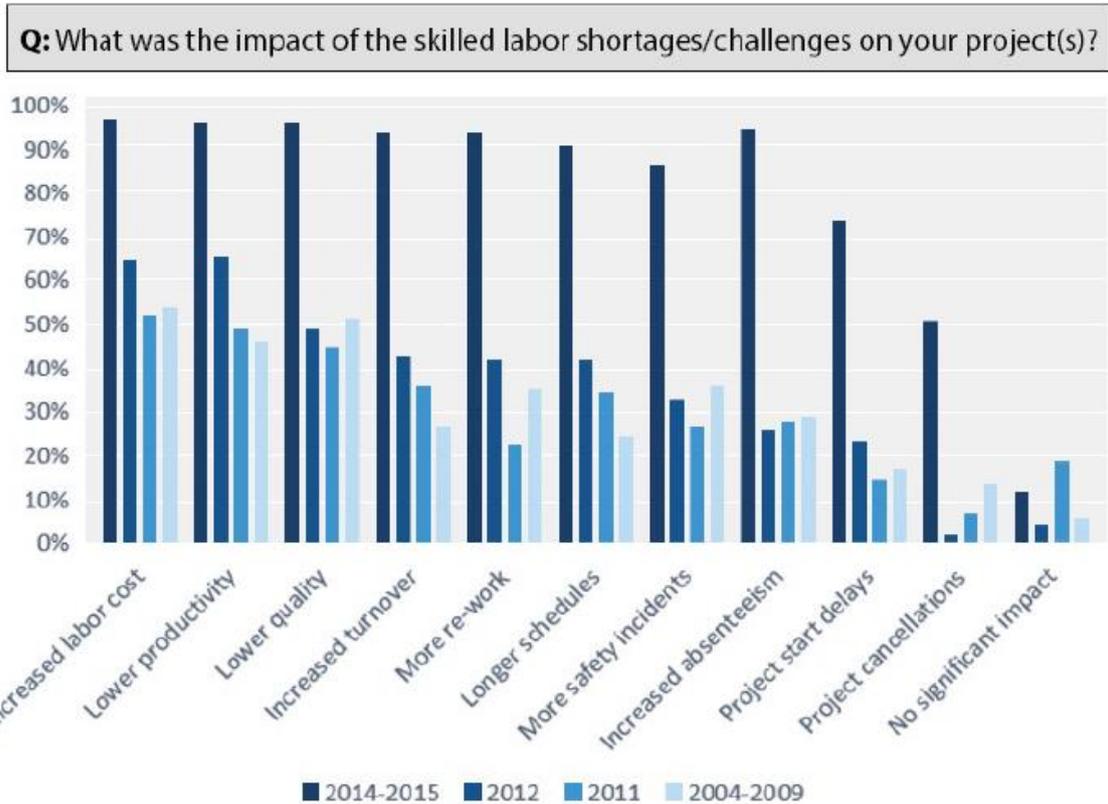
**Construction Sector Growth Forecast till 2017 (Rs. Billion)**



**Fig. 9.** Construction sector growth forecast

Thus between infrastructure and real estate, Indian construction industry has been relatively stable. Hence there is a need for skilled, retained work force is only going to increase and the skill deficit is widening. Fig. 1. shows the requirement of human resource (particularly skilled workforce) for construction industry for 2022.

The productivity loss due to skill shortage has been documented in US Construction market as well (Construction Labour Market analyzer). Fig. 10. shows the results of the survey conducted by the Construction Labour Market analyzer.



**Fig. 10.** Impact of the skilled labour shortages on projects

### ***Recommendations***

***Formally trained and certified workforce to be mandated, measure at least for semi-skilled and skilled jobs to understand the impact on productivity over time. Up-skilling of professionals on advanced technologies***

Currently, there is no visibility and understanding of ‘skill inventory’ of site-workers resulting in deployment issues that might be divergent from competencies, and hence formally training, certified at least for semi-skilled and skilled jobs would be needed. The following initiative to be taken-up at demo sites:

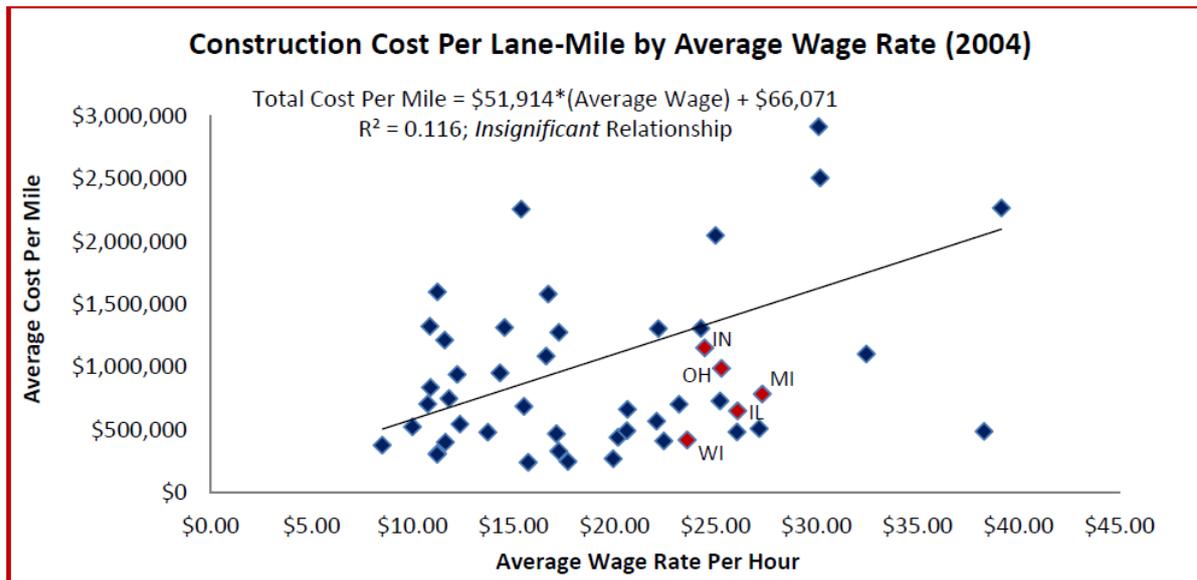
- i. Monitoring of productivity-wages-paid based on skill levels to ensure premium over minimum wages is paid to semi-skilled/skilled workers*** for ensuring their retention and also understand RoI regarding productivity for the same.
- ii. Formal training to ensure entry of ‘semi-skilled’ assistants instead of unskilled helpers.***
- iii. ‘Finishing school’ for professionals with up-skilling on latest technologies.***

### **4.1.4 PRODUCTIVITY-LINKED WAGES AS AGAINST GOVERNMENT-SET MINIMUM WAGES:**

Formulate scientific measures for skill levels, productivity, along with benchmarking and linking of wages to skill-productivity levels rather than to government-fixed, minimum-wages.

This may provide a more a cost-efficient, viable approach to construction than increasing mechanization purely to reduce manpower needs.

In many US states, The Overall cost-per-lane-mile has decreased with higher wage-per-worker indicating higher productivity:



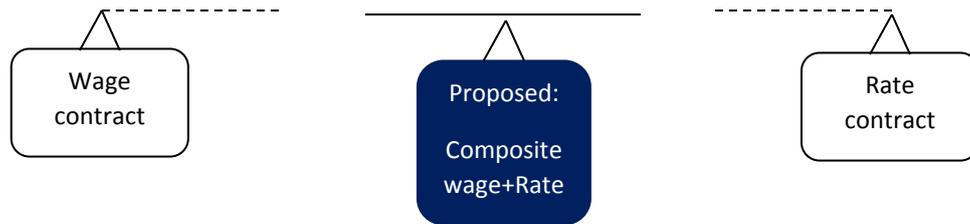
Source(s): Poupore (2004). "The Impact of Waages on Hiahway Construction Costs: Updated Analysis." The Construction Labor Research Council.

**Fig. 11.** Construction cost per lane-mile by average wage rate in the US

“Higher average hourly wages are not associated with higher construction costs. The study above that incorporated Federal Highway Administration statistics cut the data into “low wage” states and “high wage” states that all had annual road construction expenditures of at least \$100 million per year over the nine-year period. Although the average hourly wage of road construction workers was higher in high wage states than in low wage states, the hours required to construct each mile were 35.2 lower in high wage states, indicating greater productivity. Higher labour costs did not translate into higher total construction expenditures per mile, as the total cost per mile was 3.9 percent lower in the high wage states. The takeaway is that labour costs are not the whole story: “Higher wage workers can build highways with no impact on total cost because of their superior skills. ... ‘[P]roductivity is the key to calculating labour costs’” (Poupore, 2004). This finding is further substantiated by the economic research on prevailing wage laws which find that any increases in labour costs are offset by corresponding increases in labour productivity (Prus, 1996; Wial, 1999; Mahalia, 2008; Duncan, 2011; Philips, 2014)”.

**Indian Scenario:**

The current polar paradigms of rate contract or wage contract represent two ends of spectrum with rate contract being 100% variable pay ridden with full performance risk to the sub-contractor but zero risks to the manager but also results in minimal loyalty by sub-contractor who switches if he detects possible loss making or if he gets a chance to make earn more or risk less in the neighboring site, thus creating delays. The other end of the spectrum is the wage contract which has no performance risk for the sub-contractor but transfers complete risk, the cost to the manager.



**Fig. 12.** Proposed productivity linked wages

A new possibility is a composite metric of productivity linked wages with government-set minimum wages as fixed component and productivity linked-incentive as a variable component. For rate contract seekers, the same can be reversed with productivity linked incentive/rate being the substantial component and headcount related incentive as incentive component.

#### **4.2 CONSTRUCTION PROFESSIONAL-RELATED ISSUES SUGGESTED WAYS FORWARD AND FUTURE WORK**

The Research study-2 provides insight on Indian construction industry concerning occupational stress factors, perceived level of stress, work life experience, and job satisfaction. Many organizations have been developing work life programs without having a measure that has been validated across large samples. For example, some programs may be geared toward reduction of work personal life interference whereas other may focus on how work can enhance one's personal life or vice versa.

The more general construct of personal life compared to family life offers organizations the opportunity to measure the interface between work and personal life among employees without regard to employees' family status. Similarly, the work and organisation related stressor scale have been validated in the context of the Indian construction industry which can be used to understand the perceived level of organisation related stress due to work related factors and organisation related factors. According to the study findings, the work time stressors significantly related to job satisfaction and work interference with family life and work interference with family life significantly mediate the relationship between work time stressor and job satisfaction. This implies organizations should develop the policies on improving work related factors to reduce work interference to personal life which would improve the job satisfaction of the employees.

Also, the findings reveal that work time stressors are major source of occupational stress such as tight time for work and unstable working hours. So the organisation should concentrate on developing standardization in working works. Similarly, organisation position stressor significantly related to job satisfaction and worked interference with personal life. In order to improve the job satisfaction and reduce the work interference to personal life, organizations should give importance on organisation related factors such as adequate authority/ freedom for decision making, better compensation and benefits policies, career planning guidance, better promotion opportunity and job security.

## 5. CONCLUSION AND RECOMMENDATIONS

The following are the summary of the recommendations to the labour-related issues addressed through brainstorming with Action Team members and Research study-1.

### *Summary of recommendations for labour-related issues:*

1. *Mandatory digital bank account wage- payments*
2. *Provision of 'Site-id' with access control-based attendance*
3. *Skill testing of all workers and Formal training to ensure entry of 'semi-skilled' assistants instead of unskilled helpers.*
4. *Monitoring of productivity-wages-paid based on skill levels to ensure premium*
5. *'Finishing school' for professionals with up-skilling on latest technologies.*
6. *Uniforms like 'over-alls' for all site-workers*
7. *Weather-resistant accommodation along with on-site canteen, bus-travel facility like in the Middle East.*

Also, with respect to construction professional-related issues, the above section discussed the recommendations for construction organisations. In summary, it can be said that, in order to improve job satisfaction and reduce the work interference to personal life, organizations should give importance on organisation related factors such as adequate authority/ freedom for decision making, better compensation and benefits policies, career planning guidance, better promotion opportunity and job security.

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