WORKING PAPER on 'Human Capital (including Labour, Technical & Managerial, and Skills Development) and Productivity'

Ci3 *India* - Action Team 5 – 14 Oct. 2016

ABSTRACT

The major objectives of Ci3 *India* are:

1. To identify current and imminent critical issues in the Construction Industry in India
2. To compile a Roadmap for industry improvements in strategic high (& wide) impact domains
3. To launch (a) system improvement initiatives and (b) demonstration projects, in prioritized focus areas within the above strategic domains

The first objective of Ci3 *India* was addressed in the first two regional Roundtables in Chennai and Mumbai. An Action Team (Action Team 5) was formulated to look at "Human Capital (including Labour, Technical & Managerial, and Skills Development) and Productivity". Based on the discussions with the Action Team members the following agendas are being proposed by the Action Team:

1) Business case for Quasi-Formalization of workforce

Payment delays and manager-sub-contractor-crewmen inter-personnel dynamics were identified as one of the major reasons for churn in the industry resulting in an average age of construction worker as 28 years only. Thus following initiatives for 'Quasi-formalization' of 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 labor laws' mandate for Principal employer.

ii) Provision of 'Site-id' with access control-based attendance to digitally log attendance to be used for time-sheeting of wage/OT calculations. This will enable in actual head count and fair Wage/Overtime calculations without 'inflated' headcount claims from sub-contractors.

*2) **Making construction sector 'aspirational' for workers***

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.

3) ***Formally trained and certified workforce to be mandated, measure at least for semi-skilled and skilled jobs to understand impact on productivity over time. Up-skilling of professionals on advanced technologies is also proposed.*** 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 in terms of 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) ***Productivity-linked wages as against government-set minimum wages:***

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 risk 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, cost to the manager.

A new possibility is a composite metric of productivity linked wages with government-set minimum wages as fixed component and productivity linked-incentive as 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. Thus a research study needs to be done for:

1. Determining a productivity-linked-payment system with both fixed and variable components for both rate and wage contract.
2. Usage of technologies like pre-cast to understand their RoI from a scientific manner in terms of wage-productivity-investment-RoI calculations.

To summarize, the following initiatives can be piloted at demo site and two research studies are proposed,

Demo-site

1. *Mandatory digital bank account wage- payments*
2. *Provision of 'Site-id' with access control-based attendance*
3. *Skill testing of all workers*
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.

Research study

8. *Research study for productivity-linked-payment system for sub-contractors merging aspects of rate and wage-contracts for optimization at the whole project level*
9. *Similarly study on RoI and productivity for Pre-cast kind of 'Off-site' approaches*

1. INTRODUCTION

Industry scope, low productivity, time-cost over-run paradigm:

The last two decades have seen the Indian economy grow significantly. India's GDP has 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 labor.

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 labor-intensive, construction productivity is influenced by effective and efficient use of labor resources. Labor costs generally 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 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.

Labour skill shortage is an underlying causative factor:

Skill is at the root of productivity (Prashant and Sachin, IJRITCC 2015)

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
TOTAL MANPOWER	92 million man years

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

Thus the current skill worker employment is 3.3 mn with a need for 7 fold increase in next 5 years and the shortage of skilled labour is causative factor for lower productivity as sites, project over run.

Attrition leading to Constant churn out of industry is another underlying causative factor:

A 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 industry.

2. METHODOLOGY

As mentioned earlier, the first objective of Ci3 *India* was addressed in the first two regional Roundtables in Chennai and Mumbai. 19 current and imminent critical issues were identified, verified and validated in the two regional Roundtables. Identified issues were then converted into Action Items. Action Teams were then formulated to work on those issues.

Action Team 5, i.e. “Human Capital (including Labour, Technical & Managerial, and Skills Development) and Productivity” was formulated to study the following six issues which are among the 19 identified current and imminent critical issues in the Indian construction industry.

- 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

At the first instance, a through literature study was carried to understand the issues in the management of construction workers in Indian projects. An exploratory study was also conducted across 15 construction projects in the country to better understand the management of construction workers in the present scenario. For the sake of brevity, review of relevant literature, detailed explanation of the exploratory survey findings are not discussed here. The same has been published elsewhere (Loganathan and Kalidindi, 2016).

Following the literature study and the exploratory survey, the Action Team members has subsequent Conference-calls for Joint brainstorming to propose the various Action Agendas. However, the detailed the methodological approach will be elaborated further in the forthcoming White Paper.

3. RESULTS, DISCUSSION AND FUTURE ACTION POINTS

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

3.1 Quasi-Formalization of workforce – Establishing a Business case:

Quasi-Formalization of 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 shown in Fig. 2 and Fig. 3.

4. Factors causing turnover of workers as reported by managers and labor sub-contractors

Fig. 2. Factors causing turnover of construction workers

Action Plan

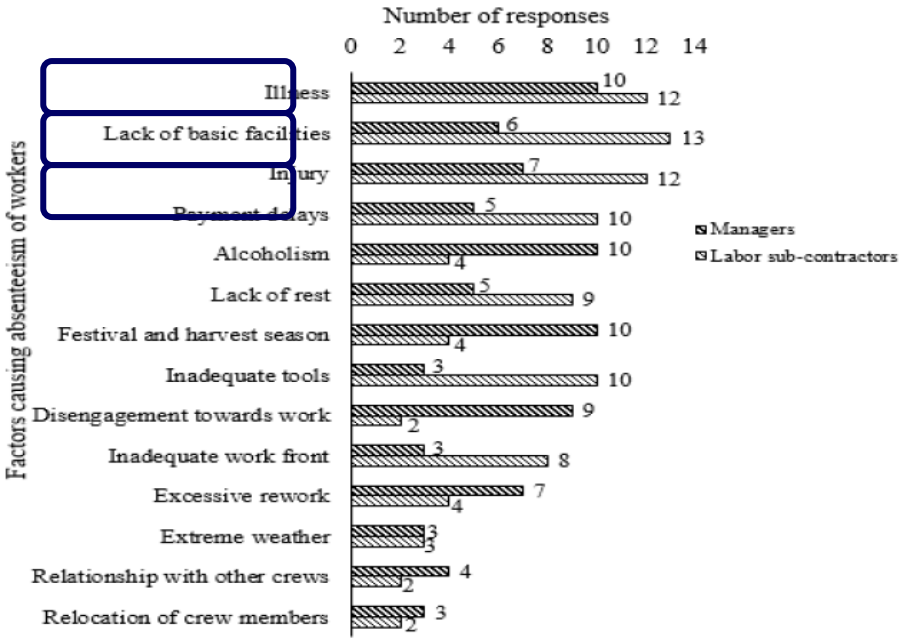
Thus following initiatives for 'Quasi-formalization' of workforce were suggested could be started in 'Demo-project sites':

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 labor laws' mandate for Principal employer.

ii) Provision of 'Site-id' with access control-based attendance to digitally log attendance to be used for time-sheeting of wage/OT calculations. This will enable in actual head count and fair Wage/Overtime calculations without 'inflated' headcount claims from sub-contractors.

3.2 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 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.



. Factors causing absenteeism of workers as reported by managers and labor sub-contractors

Fig. 3. Factors causing absenteeism of construction workers

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 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. 4.

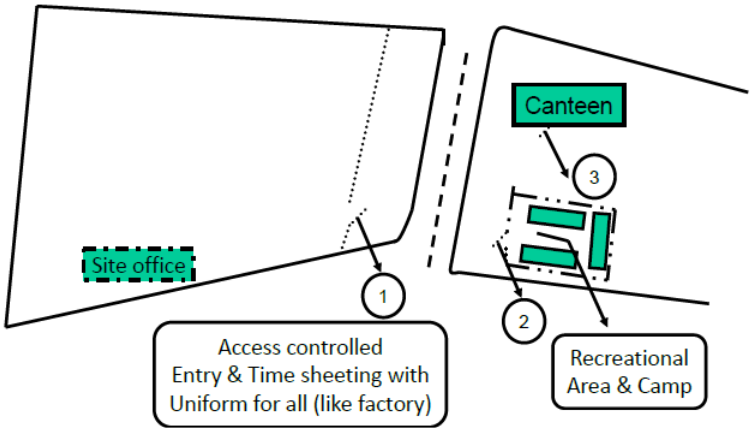
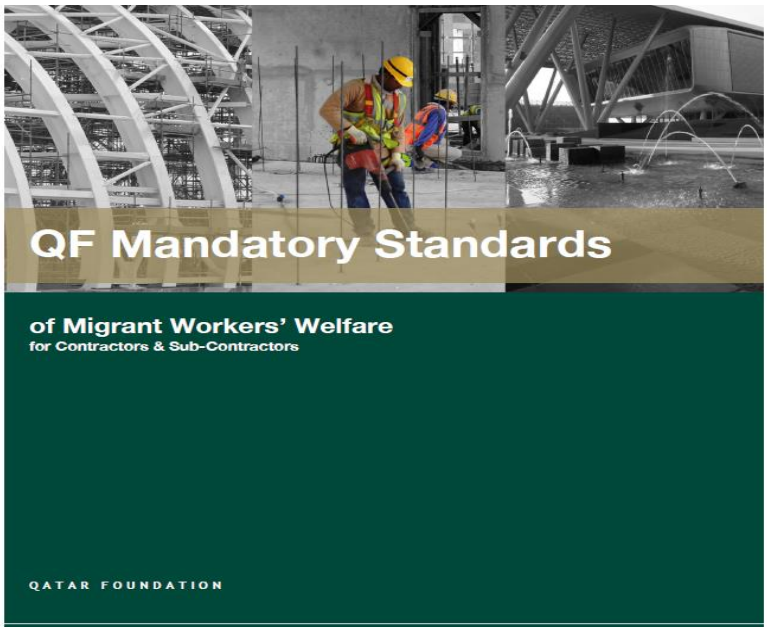


Fig. 4. Facilities for workers at site

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



Action Plan

Making construction sector 'aspirational' for workers. 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 Middle East.

3.3 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 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:

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

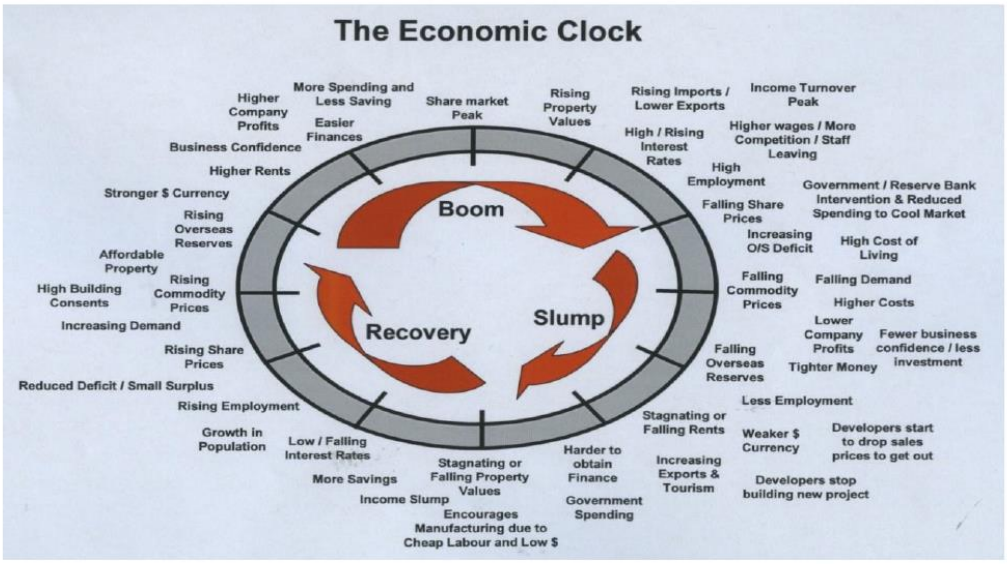


Figure 17 The Economic Clock Source: RCP

Fig. 5. The Economic clock

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 in accordance with 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 firms financial health.

- *The direct consequence of this is on 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"*

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

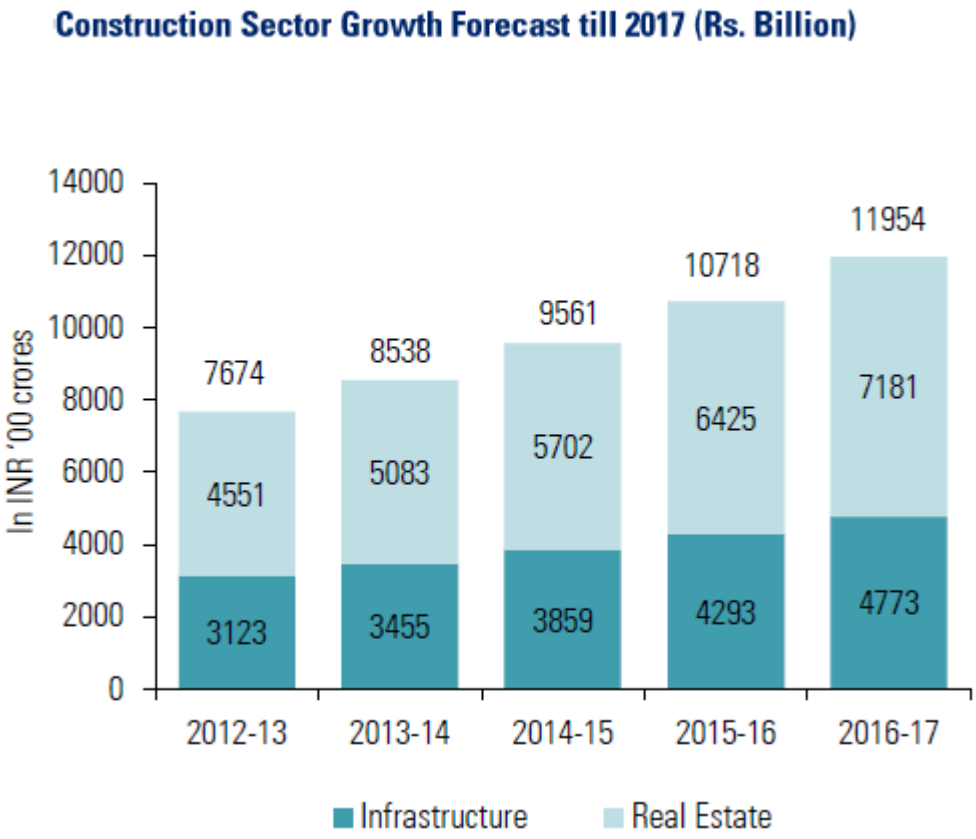


Fig. 6. Construction sector growth forecast

Thus between infrastructure and real estate, Indian construction industry has been relatively stable. Hence there is 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. 7. shows the results of the survey conducted by the Construction Labour Market analyzer.

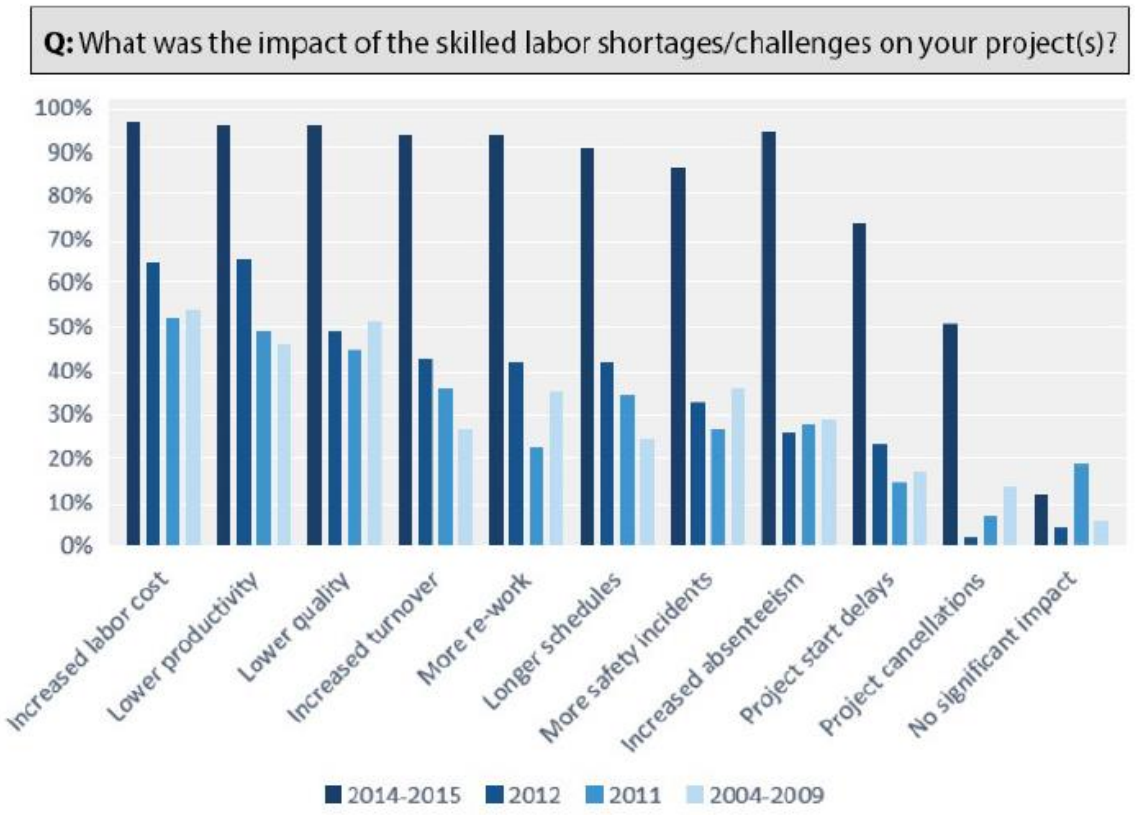


Fig. 7. Impact of the skilled labour shortages on projects

Action Plan

Formally trained and certified workforce to be mandated, measure at least for semi-skilled and skilled jobs to understand 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 in terms of productivity for the same.

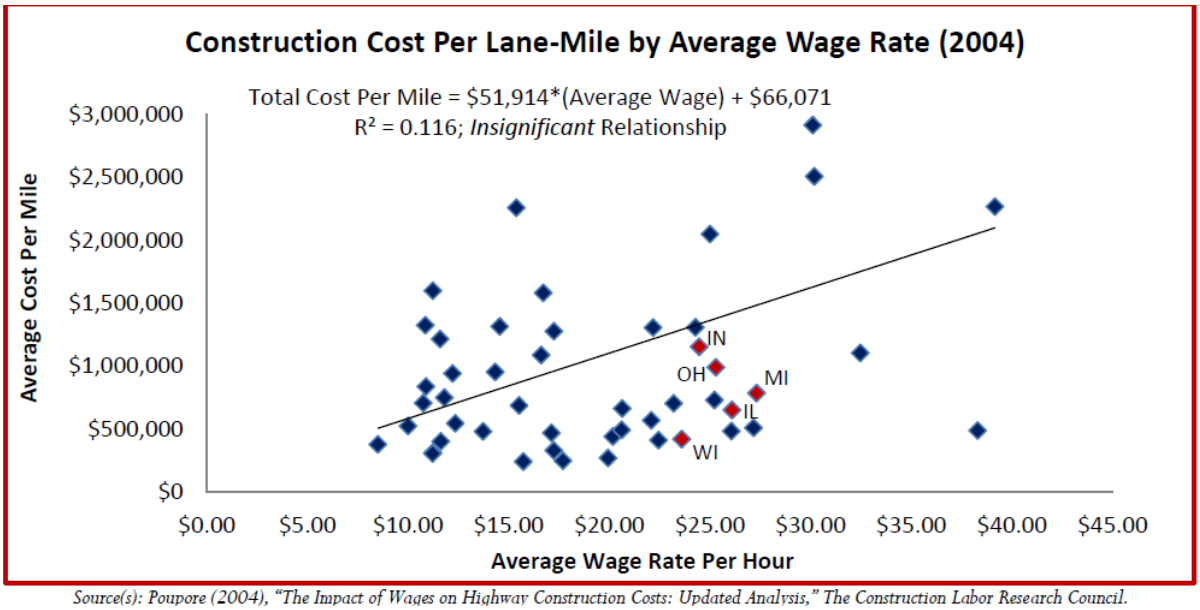
ii. Formal training to ensure entry of 'semi-skilled' assistants instead of unskilled helpers.

iii. ***'Finishing school' for professionals with up-skilling on latest technologies.***

3.4 ***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 Wages on Highway Construction Costs: Updated Analysis," The Construction Labor Research Council.

Fig. 8. Construction cost per lane-mile by average wage rate in the US

"Higher average hourly wages are not associated with higher construction costs. The aforementioned 2004 study 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 labor 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 labor 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 labor costs'" (Poupore, 2004). This finding is further substantiated by the economic research on prevailing wage laws which find that any increases in labor costs are offset by corresponding increases in labor 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 risk 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, cost to the manager.

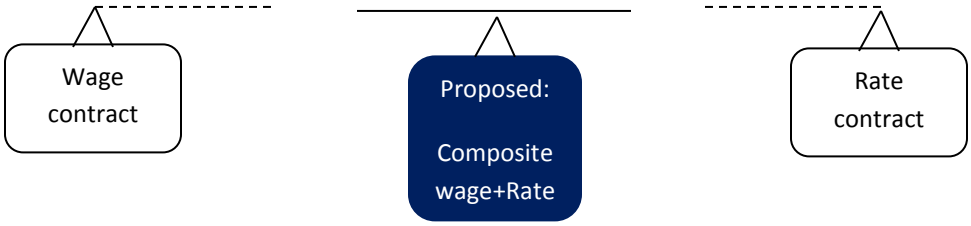


Fig. 9. Proposed productivity linked wages

A new possibility is a composite metric of productivity linked wages with government-set minimum wages as fixed component and productivity linked-incentive as 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.

Thus a research study needs to be done for:

1. Determining a productivity-linked-payment system with both fixed and variable components for both rate and wage contract.
2. Usage of technologies like pre-cast to understand their RoI from a scientific manner in terms of wage-productivity-investment-RoI calculations.

4. CONCLUSION

The following are the summary of the Action Agendas proposed by the Action Team to the Ci3 India Forum. The conclusions and recommendations can however be best finalized after receiving inputs from other Ci3 *India* members.

Summary of Proposed Action points:

Demo-site

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 Middle East.

Research study

8. *Research study for productivity-linked-payment system for sub-contractors merging aspects of rate and wage-contracts for optimization at the whole project level*