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Status Assessment of Thai Construction Workers

Korb Srinavin
Lecturer, Department of Civil Engineering, Ubon-Ratchathani University
Ubon-Ratchathani, Thailand 34190

Abstract
A construction project is considered successful if it is completed within its scheduled duration and estimated cost with acceptable quality. Considering the various factors included in a construction project, there would be general agreement that the labour force is the most important to the success of the project. During the past two decades, Thailand has exported skilled construction workers to other countries. This resulted in lack of skilled construction workers in Thailand which also effects schedule, cost and quality of construction projects. The status assessment aims to identify the construction problems related to availability, quality and productivity of skilled workers. Since most construction sites were constructed in the metropolitan area, this study is focused on eight building construction projects located in Bangkok and its surrounding areas. Of the eight construction sites, four common trades of skilled workers were selected (carpenter, steelworker, bricklayer and plasterer). Data collection was made using four major techniques: questionnaire, interview, field observation and office information. It was found that the availability of all selected trades is inadequate. Among these trades, the steelworker is the most inadequate. The quality of bricklayer is the lowest among all studied trades and needs to be improved in many areas. Carpenter and steelworker achieved high productivity due to the implementation of advanced construction technology such as tools, mechanics and prefabricated components. Among the four trades studied, the productivity of plasterer is the lowest.

Keywords
Construction Workers, Skilled Workers, Workers' Availability, Workers' Quality, Workers' Productivity

1. Introduction

The construction industry can be considered a labour-intensive industry. Most construction projects depending on a significant amount of both skilled and unskilled workers due to a wide variety of designs. Many specialised skills are needed to do the task. These skills could include some or all of the following: carpenter, steelworker (structural and reinforcement), bricklayer, plasterer, painter, concrete finisher, welder, equipment operator and electricians (Adrian, 1987).

During the past two decades, Thailand has exported skilled construction workers to other countries, mainly to the Middle East and the Far East (Wells, 1996), while they are still needed in the country. This resulted in lack of skilled construction workers in Thailand which effects schedule, cost and quality of Thai construction projects (Srinavin, 1996). Many buildings and structures have failed to satisfy the legitimate requirements in recent years because they were built using semi-skilled or unskilled workers. Once the contractor uses unqualified labour in construction, field productivity suffers due to substandard works and reworks (Ashford, 1989).

2. Methodology

This study attempted to identify Thai construction workers' problems in terms of availability of the workers, quality of work and workers' productivity. To identify these problems, an appropriate input data is needed. The right type of data must be collected in a timely manner and must be presented in the proper format. Specific data requirements are identified from the evaluation criteria and from the input requirements for evaluation and analysis purposes.

Firstly, the survey and selection of construction sites were made. As Thailand has the majority of construction projects in the metropolitan area, therefore, this study is focused on building construction projects located in Bangkok and its surrounding areas. Eight construction projects, which vary in terms of size and purpose from high-rise buildings to common residential apartments, were selected. Of the eight selected sites, four common trades of skilled workers were categorized and identified: carpenter, steelworker (reinforcement), bricklayer and plasterer. The second step is to identify the number of skilled workers shortage on site and the number of skilled workers available on site of each trade and find the ratio significant. Thirdly, the perception of the field management about work quality was discovered and compared with the developed benchmark. Also, to find out the skilled workers perception about their own quality and compared against the benchmark and field management perceptions. Finally, the productivity was identified using a production rate for a specified crew size for different trades by both skilled worker and management level. The identified productivity was, then, compared with the reported rates and determines the variance.

In order to collect the data, four major techniques: questionnaire, interview, field observation and office information were used. Questions were separated into two parts. One is for the management levels e.g. an executive officer or a project engineer. Another is for the functional level i.e. a foreman, a head of workers and skilled workers. Executive officers of each site were interviewed regarding to the quality, availability and productivity of their skilled workers, particularly of the four identified trades. For the functional level, questions were asked regarding the same as for the management level.

3. Results and Discussions

Eight selected construction projects are a 6-story hospital building, an 85-story office building, a 43-story office building, a 6-story apartment building, a 5-story commercial building, a 6-story residential building, a 7-story showroom building and a 4-story home-office building. All of these projects were constructed by general contractors.

It was found that the skilled workers, particularly in four selected trades, is inadequate. As can be seen in Table 1, all four trades of skilled workers are short in supply. The steelworker (rebar worker) has the highest percent of shortage while the carpenter has the lowest among all considered trades. This could be resulted from the fact that most construction workers in Thailand come from agricultural sector. Many of them normally go back to their farm in raining season to transplant paddy in the field. In dry season, most of the workers go to their farm again for paddy harvesting (Labour Statistics and Planning Division, 1993).

Table 1: Total number of skilled workers averaged by overall projects

No.	Trades of skilled workers	No. needed on site	No. available on site	No. of shortage	% of shortage	Remark
1	Carpenter	93	80	13	13.98	Lowest
2	Steelworker	42	32	10	23.81	Highest
3	Bricklayer	76	60	16	21.05	
4	Plasterer	66	53	13	19.70	
	Total	277	225	52	18.77	

Detailed quality survey for these four trades was conducted. For example, work descriptions shown in Table 2 show different areas of carpentry work. These work descriptions are developed and set by the department of skill development, ministry of labour and social welfare (National skills development institute, 1996). The score and rank, presented in Table 2, for each work areas were assessed by foremen, head of workers and skilled workers. This table also shows the perception of the carpenters in various activities or work areas. The lowest number of rank represents the lowest quality of work. In contrast, the higher score means the better quality (4 = very good, 3 = good, 2 = fair and 1 = poor). As presented in Table 2, the scores assessed by foremen, head of workers and skilled workers have not much variation and have no distinct differences. The first two items: 'knowledge of physical properties of wood' and 'detailed carpentry work' shown in Table 2 could be considered as the critical areas of carpentry work that need improvement.

Table 2: Carpenter's quality survey (averaged for all studied projects)

Work description	Quality score and rank assessment						Sum of rank
	Foremen		Head of workers		Skilled workers		
	Score	Rank	Score	Rank	Score	Rank	
Knowledge in properties of wood	1.63	1	2.13	1	2.25	1	3
Detailed carpentry work	2.25	2	2.38	2	2.33	2	6
Knowledge in wood storage method	2.38	3	2.63	7	2.58	6	16
Selection and installation of hardware to conform with specification	2.38	4	2.38	3	2.58	7	14
Prefabricated material installation such as gypsum board	2.38	5	2.38	4	2.42	3	12
Calculation related to carpentry work such as lumber cutting	2.38	6	2.75	9	2.83	11	26
Door and window frames installation	2.50	7	2.88	12	2.67	8	27
Plumbing and leveling of carpentry work	2.63	8	2.38	5	2.42	4	17
Raw material inspection	2.75	9	2.75	10	2.67	9	28
Drawing reading	2.75	10	2.63	8	2.75	10	28
Concrete formwork erection and removal	2.75	11	2.50	6	2.42	5	22
Scaffolding erection and removal	2.88	12	2.75	11	3.08	12	35
Average	2.47		2.54		2.58		

The detailed quality surveys for steelworker, bricklayer and plasterer were performed in the same way as for the carpenter. Results for these were summarized and shown in Table 3, which present only first two critical areas for each trade. The areas that should be improved are 'minimizing waste planing for rebar cutting' and 'fundamental knowledge of concrete formwork' for the steelworker. 'Drawing reading' is the most critical area of work for both bricklayer and plasterer.

Table 3: Summarized of quality survey (averaged for all studied projects)

Work description	Quality score and rank assessment						Sum of rank
	Foremen		Head of workers		Skilled workers		
	Score	Rank	Score	Rank	Score	Rank	
Steelworker							
Minimizing waste planing for rebar cutting	2.38	1	2.63	2	2.33	1	4
Fundamental knowledge of concrete formwork	2.50	2	2.63	3	2.56	3	8
Bricklayer							
Drawing reading	1.83	1	2.00	1	2.11	1	3
Material selection and preparation	2.67	2	2.17	2	2.22	2	6
Plasterer							
Drawing reading	1.83	1	2.00	1	2.33	1	3
Material and tools selection and utilization	2.17	2	2.50	2	2.44	3	7

To summarize the above, Figure 1 presents the workers' quality of the four selected trades assessed by foremen, head of workers and skilled workers. The workers' quality could be considered in between good and fair with the average quality score of 2.57 for all trades studied. The average score assessed by the skilled workers themselves is slightly higher than that assessed by foremen and head of workers, however, it shows no distinct difference.

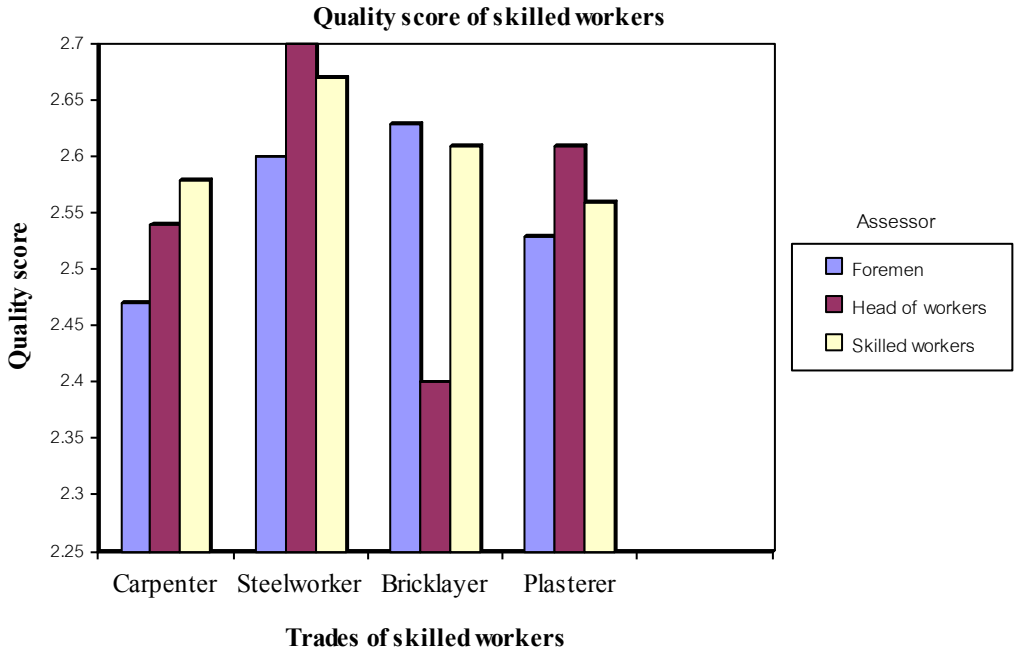

Figure 1: A comparison of skill workers' quality

The collected production rate (productivity) of Thai construction workers for eight projects in four selected trades can be summarized in Table 4. A simple beam was use as a standard for determining the productivity for carpenter (formwork erection) and steelworker (rebar bending and fixing). Also, the productivity of bricklayer and plasterer was determined using a vertical plain wall as a standard.

The productivity for steelworker has significant improvement compared to previous records reported by Liewthanamongkol (1995) and Chorwichien and Chorwichien (1991). This productivity improvement could be caused by the implementation of advanced tools and equipment such as reinforcing steel cutting and bending machines. Thus, high production rate can be achieved. The same phenomenon has also been observed for other trades such as carpenter. This could be resulted from concrete formwork technology, which increase the productivity of formwork erection and removal comparing to the conventional method.

There is slightly change in productivity for bricklaying and plastering work comparing to the previous records. This may be caused by a slow development of technology comparing to the fast growing technology in other trades.

Table 4: Summary of skilled workers' productivity studied (overall sites)

No.	Trades of skilled workers	Collected productivity	Reported productivity (averaged)	Productivity unit	Over (under) previous records	% increase (decrease)
1	Carpenter	11.9	5.9	m^2/man/day	6.0	101
2	Steelworker	377	158	kg/man/day	219	138
3	Bricklayer	9.5	8.9	m^2/man/day	0.7	6.8
4	Plasterer	11.0	11.2	m^2/man/day	(0.2)	(1.8)

The workers' productivity at present is higher than in the past because the improvement in construction technology. Another reason that supports the increasing of productivity is that many general contractors employ subcontractors for skilled labour works. The contract between general contractor and subcontractor is based on a lump-sum basis. Therefore, the subcontractor has to finish its job as fast as possible so that it can move to another job.

4. Conclusions

Thai construction industry, with fast increasing number of projects, needs more skilled workers in four common trades studied. Among these trades, the steelworker is the most inadequate. The quality of bricklayer is the lowest among all studied trades and needs to be improved in many areas. Carpenter and steelworker achieved high productivity due to the implementation of advanced construction technology such as tools, mechanics and prefabricated components while the productivity of the plasterer is the lowest.

This study can be concluded using a diagram shown in Figure 2. The availability, quality and productivity, presented in column, are the concerned areas of problem on Thai construction workers. Numbers in the figure present the value of each area concerned for carpenter, steelworker, bricklayer and plasterer. From this figure, all trades studied are short in labour supply and have the quality about fair – good. It is interesting to note that the productivity of the plasterer decrease while the productivity of other trades increase. However, the decreasing has no significant.

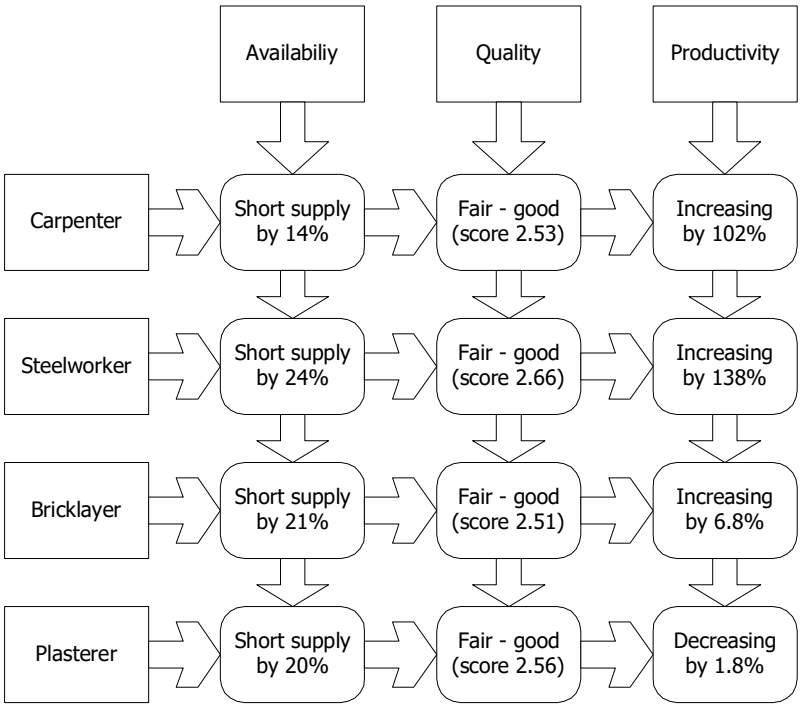

Figure 2: Status assessment of Thai skilled construction workers

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