

Analysis Factors Affecting the Outcomes of Skilled Construction Workers Training in the Region of Central Sulawesi Province

Nirmalawati*, Mastura Labombang, Adnan Fadjar

Senior Lecturer, Civil Engineering Department, Engineering Faculty, Tadulako University, Palu, Indonesia

Abstract. Skilled workers in the field of construction is increasingly in demand along with the development of infrastructure development, especially in the region of central Sulawesi Province. Because of that therefore it is needed skilled workers that has the competent. So that many training of skilled workers. The purpose of this research is (1) to know the factors that influence the results of the training of skilled workers; (2) to evaluate the training model with the conditions of skilled workers in the region of Central Sulawesi Province. The research used quantitative, descriptive-correlational approach. Data collection by distributing questioners and structured interviews to contractors, field supervisors and project owners of Central Sulawesi Province as respondents. Data analysis using descriptive statistics, the value of Relative Rank Index (RRI) used to determine the important factors in sequence. The result of the research concludes that: (1) The most important factor of skilled workers training of Central Sulawesi Province; learning process, the ability factor of the instructor and the support of facilities and infrastructures; (2) The results of the evaluation the training model in accordance with the conditions using Project Based Learning Methods, because in accordance with the conditions of Central Sulawesi Province which has a different location project.

1 Introduction

Training for skilled construction worker performed in Central Sulawesi province is one of the programs of the central and local governments to improve the skills of construction workers. Along with the growth of infrastructure development across Indonesia, especially Central Sulawesi Province, one of the requirements is skilled workers competent in their fields. This way, constructions in Central Sulawesi Province will run smoothly because they have competent or skilled human resources. The study By [11] titled "*A Training of Construction Workers in Pakistan*", mentions that construction industry plays an important role in economic and social development. Factors which must be noted are enhancing workforce development by evaluating the training system by studying the curriculum, instructor and training participant requirements.

Based on a preliminary study by the researchers on the result of construction worker training in Central Sulawesi Province, some skilled workers haven't worked in accordance with their skills. As a result, local workers can't compete with workers from outside of Central Sulawesi Province. Skilled workers are human resources, which are a factor to support the success of construction work. As explained in Act [17] on Construction Service

states that the role of local government is required in developing construction service. Construction service development by local government is expected to be better, i.e. local government should be able to make Standard Norms of Guidelines and Criteria (NSPK) as a basis for construction development in the region. Development of construction workers by local government notes the required competencies of every existing worker. In accordance with a statement from [14], competency is character of someone related with the effectiveness of individual's performance at. Provincial construction service development also mentions in article 7(1) of the Government [22] on Implementation of Construction Service Development that Provincial Governments, Regency Governments and City Governments implement Construction Service Development to perform regional autonomy tasks to: (a) develop Human Resources in Construction Service; (b) enhance technological skills of Construction Service; (c) develop Construction Service Information System; (d) research and development of Construction Service; and (e) supervision of cross-Regency/City environmental governance.

Based on the field observation, some construction works in Central Sulawesi Province have joined government trainings, but most aren't fully competent in their field. This will affect their work results. Based on

* Corresponding author: nirmalawati_she@yahoo.co.id

the obstacles or disadvantages described above, the researchers were interested to study further the factors influencing the training result of skilled workers in Central Sulawesi Province and evaluate training model which suits the condition of skilled workers. Therefore, the purposes of this study were (1) to determine factors influencing the training result of skilled worker; (2) to evaluate training model which suits the condition of skilled workers in Central Sulawesi province.

2 Literature Review

2.1 Training of Skilled Construction Workers

2.1.1 Skilled Workers

Worker is every person able to work, whether within or outside of work relation to produce service or goods to fulfill one's own or society's demand. According to [5] states that worker is one of the resources which isn't easy to manage. Therefore, it's concluded that skilled construction worker is someone who has ability consistent with their skill to do a job in construction project environment.

According to [13] states that training is a series of activities designed to enhance skills, knowledge, experience or change of one's attitude. Training is to improve mastery of various skills and certain regular and detailed work techniques. Meanwhile, to [4] states that training is a process of teaching skill required by employee to perform their job. Training for employee is a process of teaching certain knowledge and skill, as well as attitude, so that the employee will be more skillful and able to perform their responsibility better consistent with standard.

Law number on manpower [18], article 9 on Workforce states that work training is held and directed to equip, enhance and develop work competency to improve ability, productivity, and welfare". It's described in the regulation of minister of public works and public housing. By [21] on Guideline for Construction Competency-based Training which states that competency-based training, hereinafter referred to as PBB, is work training which emphasizes on mastery of work ability which includes work knowledge, skill, and attitude consistent with standard and requirement in effect in workplace.

From the description above, it's concluded that skilled construction worker training is a learning processed where skilled construction worker can achieve certain ability consistent with their skill in construction. The learning results were knowledge, skill, and attitude.

2.1.2 Training Model

Training model for construction worker today should be based on worker competence which is based on the Decision of Minister of Public Work [19] on implementation of Work Competency Standard for Skilled Workers and Expert Workers in construction.

Law of Construction Service [17], in chapter VII on construction worker in article 69 states that in clause (1) construction worker training is held with relevant, effective, and efficient work training consistent with Work Competency Standard; and clause (2) training as referred to in clause (1) refers to increasing work productivity. Article 70 clause (1) states that every construction worker in Construction Service must have Work Competency Certificate, and clause (2) states that every Service User and/or Service Provider must employ construction worker who has Work Competency certificate as referred to in clause (1). Clause (3) states that Work Competency Certificate as referred to in clause (1) is gained through competency test consistent with Work Competency Standard.

Therefore, important characteristics of competency-based training model is not only focused on workplace but also should be able to be transferred and implementing skills, knowledge, and attitude in new situation and environment by developing cognitive, affective and psychomotor domains. Competency-based training model uses approach to influence one to achieve competency consistent with set standard. Result focus is education and training process, so one who has competency or is competent should do as they should. The implementation of competency-based training model today by related institutions and work training centers should be monitored by studying the characters and qualities of existing skilled construction workers.

To achieve training purposes, [8]) states that there are various training models, including: (1) On The Job Training which is direct training in workplace; (2) Vestibule method which is separate room for location of training for new employees who will occupy certain job and is suitable for many participants; (3) Demonstration method which is a demonstration showing and planning job or how something is done, the method involves reenactment; (4) Apprenticeship method which is a way to develop skill in which worker seems to work but while learning; (5) Simulation method which is a method which creates a situation or event or creating reality or imitation of reality; (6) Classroom method which is used to increase worker's knowledge and is easier to learn indoors because it usually discusses concepts, attitudes, theories, and problem solving skill to learn.

The Regulation of Minister of Public Work and Public Housing [21] on Guideline for competency-based training of construction serve, in chapter IV article 6 clause 3, states that training can be performed by the following approaches: (a) off -the job training; and (b) on-the-job training. Off- the Job Training can be performed using the following methods: (1) classroom training; (2) training in workshop and/or laboratory; (3) distance learning; or (4) mobile training.

Meanwhile, on-the-job training can be performed using the following methods: (1) training in participant's company or workplace; or (2) distance learning. The methods can be used separately or combined in accordance with training method used to achieve training purpose and training participant's competency. On-the-job training uses the following learning strategies: demonstration, field practice, brainstorming, and case

study (problem solving). Therefore, competency-based training for construction workers must have learning achievement which is as expected. Learning achievement is ability gained through internalization of knowledge, skill, work attitude, competency, and accumulation of work experience.

By [6] in *“Training the Construction Workforce: A Case Study of Malaysia”* state that to enhance the competency of construction workers, there should be effective training type consistent with the very complex demands of construction industry. The research result offers a training type called *“Construction Industry Master Plan (CIMP)”*. An earlier research on Workforce or human resources is performed by [9] in *“Supply Demand of Human Resources in Construction in Sulawesi Province”* in cooperation with LPJKN with ministry of Public Work. One of the research result is that the recommended government policy to improve the competency of construction human resources (SDM) in Central Sulawesi Province should now be given to empower human resources in construction. The research concludes that there should be a study to improve skills of construction workers by making model application which suits the region and characters of existing construction workers.

2.1.3 Project-based learning

Project-based learning is a learning method which uses project or activity as media. The method can provide understanding, better thinking skill than conventional learning model. Here students play active role to solve problem, make decision in solving problem in the field. As stated by [16], project-based learning is a systematic teaching method which can involve student to learn to gain knowledge and skill through a development of inquiry process which is structured complexly with authentic questions and is designed well to produce product. The result of a research by [10] titled *“Implementation of Project-based Learning Method to Improve the Quality of Industrial Practice Learning in Undergraduate Study Program of PTB”* shows that the learning significantly improves student learning result and the implementation of project-based learning can improve the quality of learning process.

From the description above, it's concluded that in project-based learning, training participant is encourage to design in accordance with their competency, i.e. formulating work, designing, calculating, performing work and evaluation work result. Therefore, participant immediately practices in the field after gaining material in accordance with their job. The method is expected to improve the skills of existing construction workers faster.

2.2 Factors Influencing Training Model

So that worker training can be effective and efficient, it should be planned well to get satisfactory result. Some factors influencing the success of training should be able to be evaluated. By [3] in his study in 1988 analyzes the

poor skill of workforce in Britain by surveying South-East region. The research shows that quality and number of training participant should be noted. The research result is used to determine future prospect in solving the problem of poor skill in long-term construction industry. Similarly, Mangkunegara (2006) states that various factors influencing training model are: (1) clear and measurable training purpose and target; (2) sufficiently qualified expert instructor; (3) training material adjusted with purpose to be achieved; (4) training method in accordance with skill of participating worker; and (5) qualified training participant. Hasibuan (2005) also states that factors influencing education and training include: (1) participant, (2) instructor, (3) education and training facilities, (4) curriculum, and (5) Education and Training fund.

From the opinions above, it's conclude that some of the factors influencing training model are: (1) educational background of participant, (2) instructor ability, (3) facility and infrastructure supports for learning process in training; (4) learning process on learning achievement of participant in training, (5) learning achievement of participant on success of work skill training.

3 Research Method

3.1 Research sites

The research location was Central Sulawesi Province which is the largest province in Sulawesi with land area of 68.033,00 km². Central Sulawesi Province is bordered at the north by Sulawesi Sea and Gorontalo Province, at the east by Maluku Province, at the south by South Sulawesi and Southeast Sulawesi Provinces, and at the west by Makassar Strait. Data was collected in all regencies, i.e. Banggai Islands, Banggai, Banggalaut, Morowali, North Morowali, Poso, Donggala, Tolitoli, Buol, Parigi Moutong, Tojo Una Una, Sigi, and City of Palu.

3.2 Research design

This was a descriptive correlational study. It's descriptive because researcher tries to gain information related with phenomenon which is currently observed [2]. The researchers tried to describe existing data. The population in this study was contractors, field supervisors and project owners performing construction works in regencies in Central Sulawesi Province.

The measurement used Likert scale to measure attitude, opinion and perception. The criteria of questionnaire answers in this study were 5 for very good (SB), 4 for good (B), 3 for moderate (CB), 2 for poor (KB) and 1 for very poor (SKB). Interval of scale table of factor influencing training result was determine as in table 1.

Primary data was collected by directly distributing questionnaires to 52 respondents in Central Sulawesi Province. Secondary data was data of the number of construction workers joining training, which was

collected from the office of Ministry of Public Work of Provincial Construction Guidance. After the questionnaires were returned and 52 were collected, data analysis was performed using statistics which was solved using SPSS software. Calculation used Relative Rank Indeks (RRI) to determine factors which most influenced the result of skilled worker training in Central Sulawesi Province. It was based on ranking to facilitate comparison of requirements in performing worker training to be evaluated further. RRI formula is:

$$RRI = \frac{1}{nN} \left(\sum_{i=1}^i l_i x_i \right) \quad [12]$$

where:

- n = highest rate likert scale
- N = total of respondents
- i = 1,2,3,....., n
- li = Likert scale where 11 is the lowest scale and the highest scale 1n
- xi = frequency value of the selected scale of respondents from i = 1 up to n.

Table 1. Measurement Scale Factors Affecting the Results of Training

Score 20-39 (%)	Score 40-59 (%)	Score 60-69 (%)	Score 70-85 (%)	Score 86-100 (%)
Bad	Not good (D)	Enough (C)	Good (B)	Very good (A)

4 Results and Discussion

4.1 Results of Validity Test and Reliability

Validity test is test of accuracy or precision of a measurement in measuring what is being measured in understandable description. Validity test is a test to determine whether a set of measurement has correctly measured what should be measured. Meanwhile, reliability test is an index showing how far a measurement can be trusted or relied on. If a measurement is used twice to measure the same phenomenon and the measurement results are relatively consistent, the measurement is reliable. In other words, reliability shows consistency of a measurement in measuring the same phenomenon.

The result of instrument test on 52 respondents using 17 items analyzed by SPSS program version 23 produces alpha coefficient 0.84, meaning measurement scale of the instrument was reliable at alpha 0.8, while every item on average produces 0,385 to 0624. It shows that all 17 items are valid to use.

Table 2. Result of Rank Counting Factors Affecting the Training Model

No	Questioner	RRI	%	Rank
1	Skilled workers have skills in their fields.	0.623	62.308	10

2	Skilled workers have experience in accordance with their work.	0.6115	61.154	12
3	Skilled workers have high motivation in working.	062.30	62.308	10
4	The instructor has a science that is appropriate to the content.	063.84	63.846	5
5	The instructor can deliver the content well.	062.69	62.692	9
6	Teacher instructors have experience in practical work in the field.	064.31	64.314	3
7	Teacher instructors have high motivation in learning.	061.92	61.923	11
8	Where the training room is very supportive	0.6192	61.923	11
9	Place the training room according to the capacity of the participants.	0.6077	60.769	13
10	Places of work in the field support in the learning process.	0.6423	64.231	4
11	The place of practical work in the field is close to where the classroom is learning.	0.6154	61.538	14
12	The implementation model of classroom learning needs to be improved.	0.6615	66.154	1
13	The implementation of classroom learning is packaged to be easily accepted.	0.6577	65.769	2
14	Modules or materials provided in accordance with the competencies requested.	0.6077	60.769	13
15	Participants follow the training to completion.	0.5731	57.308	15
16	Participants may receive theoretical results given by the instructor.	0.6308	63.077	6
17	Participants can practice the work of a given theory.	0.6269	62.692	7
	Total Average		62.516	

From data processing above, factors influencing Skilled Construction Worker training in Central Sulawesi are shown. Learning process had the highest ranking, followed by instructor's ability, then facility and infrastructure support. The last influencing factor was learning process. Therefore, the following can be described:

4.2 Background of Training Participants

From the questionnaires distributed to the respondents, it was found that all participants had moderate skills, experiences and motivation i.e. 62.308% , 61.154% and 62.308%, respectively. Factors influencing worker time training model didn't have high rank. It's because the number of skilled workers in Central Sulawesi Province was limited. Therefore, local government should pay closer attention to the Regulation of Minister of Public Work and Public Housing [21] on Guideline for Construction Competency-based Training in construction service, which states that competency-based training is work training which emphasizes on mastery of work ability which includes work knowledge, skill, and attitude consistent with standard and requirement in effect in workplace. Therefore, every construction worker working in Construction Service is expected to have Work Competency Certificate, and every Service User and/or Service Provider must employ construction worker who has work competency certificate as referred to in clause (1) work competency certificate as referred to in clause (1) is obtained from competency test consistent with work competency standard. However, they need more experience and motivation to improve their skill.

4.3 Instructor's Ability

Based on the research result, one of the factors influencing skilled worker training result was instructor's ability, i.e. mastery of material and experience of field practice. From the ranking result, teaching instructors having experience in work practice in the field was on the third rank with 64.314% and teaching instructor having experience in work practice in the field was on the fifth rank with 64.314%. Therefore, it was suggested that worker training should have instructor with suitable expertise.

The research result showed that the existing instructor resources was quite good, but requiring improvement in assigning instructor with suitable knowledge and mastery of field skill implementation. As stated in the Appendix III of Regulation of Minister of Public Work and Public Housing Number [21] on Guideline for Construction Competency-based Training in Construction Service, training facility includes instructor. It explains that instructor must be able to act as source, facilitator, guide, assessor, and driver in training, as well as able to combine the roles according to the condition and situation

4.4 Facilities and Infrastructure Support

Based on the result of the questionnaire distributed to the respondents, overall facility and infrastructure support was quite good. The factor on the fourth spot was work practice location in the field supporting learning process which received 64.231%. However, it should be noted that in looking for location for work practice in the field, despite the moderate result, it should be improved in future evaluation. As shown in On The Job Training model which is direct training in

workplace which can use several learning strategies, including demonstration, direct field practice, brainstorming, and case study (problem solving). Therefore, appropriate place is necessary for required skill.

4.5 The Learning Process

The learning process is one of the most important factors in conducting the training of skilled workers, from the results of the research can be seen in the ranking position to one and two, namely the model variables of the implementation of classroom learning, as well as the implementation of learning variables packaged in order to be easily accepted. This can be seen from the result that reach percentage of 66.154% and 65.769% which is good enough category. From these results, it is necessary to make major improvements in the delivery of learning models in order to achieve more satisfactory results. From the results of additional research interview gets additional data that the module provided for better packaging so that participants can easily receive it. As it is known there are some related learning models in the training of skilled construction workers. Participants hope they can practice the theory easily after receiving the materials and instruction of the instructor.

From the existing theory, one of the suitable learning models in workers training is a project-based learning model, which is a learning model designed to be used on complex issues that participants need in investigating and understanding it. So the first step in this model uses problems in collecting and integrating new knowledge based on real experience. From the results of questionnaires and some interviews then the most important thing in improving skilled manpower skills is to replace the learning model, that is by using a model that is directly practiced in the workplace in accordance with various types of work required. Therefore, it is necessary to improve the training by applying the learning model using the project based model.

4.6 Participant's Achievement

The questionnaire result of participant's achievement showed that participant being able to accept theory and participant being able to practice, should be noted. They ranked sixth and seventh with 62.692% and 63.077% which were quite good. Therefore, worker training should be reevaluated to produce workers with excellent skills and suitable competencies. Similarly, Wibowo (2007) states that competency is an ability to perform or do a work or task based on skill and knowledge and supported by work attitude demanded by the work. Therefore, worker's competency is required in improving their performance.

In line with this, the research by [1] in Nigeria titled "*Causes of Low-Skilled Workers' Performance in Construction Projects*" concludes that factors causing low performance in skilled worker are (1) low wage, (2)

lack of adequate skill training center, (3) poor incentive scheme program, (4) vulnerability to safety service and health treatment and (5) lack of standard pay scale for skilled worker. The end result is workers require high motivation, so that construction industry in Nigeria will be successfu

4.5 Training Models

The result of the questionnaires distributed to the respondents showed that the most dominant factor to note was learning process. Consistent with the study by [10] titled “Implementation of Project-based Learning Method to Improve the Quality of Industrial Practice Learning in Undergraduate Study Program of PTB”, this learning can significantly improves college students’ learning outcomes and the implementation of project-based learning can improve the quality of learning process. Therefore, future training should use project-based learning method which can be performed in project location. Project locations in Central Sulawesi Province are far from each other and far from city center. Some benefits on this training model are time and cost effective and efficient, and the participants being able to join training without leaving their jobs.

5 Conclusion

From the discussion above, it’s concluded that: (1) Factors which most strongly influenced the result of skilled worker training in Central Sulawesi Province were learning process, instructor’s ability and facility and infrastructure support. Overall, the activity result was quite good; (2) Training model which suited the condition of skilled workers in Central Sulawesi Province was Project-based Learning Method because it matched Central Sulawesi Province which had spread out project locations.

Suggestion

- The central and local government should fully provide financial support for empowering skilled construction worker in Central Sulawesi Province.
- The government and private sector which manage skilled worker empowerment should evaluate the activities by using Project based learning method.
- Other researchers should perform further research on other factors influencing the improvement of performance of skilled construction workers.

References

1. Alhaji, Z. & et, *Causes of Low-Skilled Workers’ Performance in Construction Projects*, Pakistan, (2009)

2. Arikunto, *Prosedur Penelitian (Suatu pendekatan praktek)*. Jakarta, Rineka Cipta, (2002)
3. Briscoe, G. "Skill Shortages in the Construction Sector", *International Journal of Manpower*, **11** Issue:2,pp.23-28, England, MCB UP Ltd, (1990)
4. Dessler, G., *Manajemen Sumber Daya Manusia* Jilid II. Jakarta, PT Indeks,(2006)
5. Ervianto,W., *Manajemen Proyek Konstruksi*. Edisi Revisi **I**, Yogyakarta, Andi Offset, (2002)
6. Hassan, F.etc, *Training the Construction Workforce: A Case Study of Malaysia*, Malaysia, Centre of Excellence, MARA University of Technology,(2009)
7. Hasibuan, M., *Manajemen SDM*. Edisi Revisi, Cetakan Ke **Tujuh**, Jakarta, Earth Literacy, (2005)
8. Mangkunegara, A. P.,*Evaluasi Kinerja SDM*, Bandung, PT Refika Aditama, (2006)
9. Nirmalawati, "*Supply Demand Sumber Daya di Bidang Konstruksi di Provinsi Sulawesi Tengah*", Jakarta, PU Bina Konstruksi, (2012)
- 10.Pribadi, “Penerapan Model Pembelajaran Berbasis Proyek untuk meningkatkan kualitas Pembelajaran Pratik Industri pada Prodi S-1 PTB”.*Journal of Research Kependidikan*, number **1**, (2008)
- 11.Riaz, Z., & etc. Training of Construction Workers in Pakistan, *European Journal of Business and Management*,www.iiste.org.ISSN 2222-1905 (Paper) ISSN 2222-2839 (Online)., **7**, No.1, hal. 284-296, (2015)
- 12 Santoso, Singgih., *Statistik dengan SPSS*, Jakarta, Elex Media Komputindo, (2002)
- 13.Simamora, H., *Manajemen Sumber Daya Manusia*. Edisi ke-**3**, Yogyakarta, YKPN School of Economics, (2004)
- 14.Spencer & Spencer., *Competence at Work: Modes for Superior Performance*, New York, John Willey & Sons, Inc, (1983)
- 15.Wibowo, *Manajemen Kinerja*, PT Rajagrafindo Persada, (2007)
- 16.Widiyatmoko, “Pembelajaran Berbasis Proyek Untuk Mengembangkan Alat Peraga IPA dengan Memanfaatkan Bahan Bekas Pakai. J. Pendidikan IPA Indonesia. **X**, *Unnes Journal*, Semarang (2012)
17.Undang-Undang Republik Indonesia No 02 Tahun 2017, Tentang Jasa Konstruksi, Jakarta, (2017)
18.Undang-Undang Republik Indonesia No 13 Tahun 2003, Tentang ketenagakerjaan, Jakarta, (2003)
19. KepMen Pekerjaan Umum Nomor 340/KPTS/M/2007,Tentang Penetapan Standar Kompetensi Tenaga Kerja Terampil dan Tenaga Ahli di Bidang Jasa Konstruksi, Jakarta, (2007)
20. Peraturan Menteri Pekerjaan Umum Republik Indonesia No 09 Tahun 2013 jenjang kualifikasi tenaga kerja, Jakarta, (2013)
21.Peraturan Pemerintah No 24 Tahun 2014, Tentang Pedoman Pelatihan Berbasis Kompetensi Bidang Jasa Konstruksi. Jakarta, (2014)
22.Peraturan Pemerintah No 30 Tahun 2000, Tentang Penyelenggaraan Pembinaan Jasa Kostruksi. Jakarta, (2000)