
High-speed railway operations expert training development in Indonesia

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ABSTRACT

KCIC Phase I Training Program will accommodate 500 Participants from the total HR needs of PT KCIC from 1,452 people. The focus on increasing competence in the Operation System, Passenger Service, and Maintenance is divided into 21 Training Posts, most of the participants came from Fresh Graduates who entered the Entry Level. Required Competence Levels ability to apply knowledge and skill in High-Speed Railway Technology. Technical executive level is required for High-Speed Railway operation and maintenance for Electric Multiple Unit (EMU) KCIC400AF Type from China. The participant competency gap between the existing competence levels and required competence levels is calculated at 100%, so the training program will be carried out in accordance with the training curriculum of the HSRCC. The training program consists of 4 parts consisting of (1) Indonesian regulation, instructors from Indonesian Railway Polytechnic; (2) Professional Knowledge, the instructor from Tianjin Railway Technical and Vocational College and Southwest Jiaotong University; (3) Safety & regulation, the instructor from China Railway – Beijing; and (4) Practical skills instructor from China Railway – Beijing. The delivery method uses the online class method which interpreters and assistant lecturers in each class will accompany. In the language interpretation stage, a multiplier coefficient of 2.5 is obtained from normal lesson hours in the HSRCC curriculum if it is implemented in Indonesian participants. The duration of the training implementation is about 1 – 8.5 Months. The next competency requirement is High-Speed Railway trainer from Indonesia. The provisions conveyed by HSRCC, participants who have taken the training phase I and received an evaluation score of training and competency certification above the average of other participants are able to take part in the Training of Trainers for High-Speed Railway and pass the Competency Test of Trainer Candidates.

Keywords: High-Speed Railway; Human Development, Training

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INTRODUCTION

PT Kereta Cepat Indonesia China (KCIC) is a company that operates the Indonesian high-speed train which was built on the Jakarta–Bandung route. The company was formed as a joint venture between the Pillar of Synergy of Indonesian State-Owned Enterprises at 60% and the HSRCC consortium company, Beijing Yawan HSR Company Limited, at 40%. PT KCIC will manage the operation of the Jakarta-Bandung high-speed train (kontan.co.id, 2022).

According to Presidential Regulation No. 109 of 2020 (Kementerian Perhubungan, 2020), High Speed Rail Construction is included as a National Strategic Project. The designated route is the Jakarta–Bandung route as far as 142.3 km. The number of stations calculated referring to the China Code for Design of High-Speed Railway obtained four stations: Halim, Karawang, Walini, and Tegalluar. Each station will be equipped with facilities to support transit-oriented development (TOD) around the station. Based on cost efficiency, Walini Station will be shifted to Padalarang simultaneously for mode integration reasons. The construction of the Jakarta-Bandung high-speed rail line is designed with a maximum speed of 400 km/hour, so the components that make up this high-speed rail line are very different from existing rail lines in Indonesia (indonesiabaik.id, 2022).



Figure 1. KCIC400AF in production at the Qingdao Sifang CRRC factory

The type of train series that will be used to operate the Indonesian high-speed rail network on the Jakarta–Bandung route is of the Electric Multiple Unit (EMU) type. The train, made by CRRC Qingdao Sifang Ltd, is based on the CR400AF/Fuxing design with the KCIC400AF series and can go up to 350 km/h. PT KCIC will operate 11 series of KCIC400AF trains with 8 trains per circuit and 1 unit of inspection train. PT Kereta Cepat Indonesia China (KCIC) declared that the progress of the Jakarta-Bandung high-speed rail project will be completed in 2022 with a target of operating in 2023 (dephub.go.id, 2022).

Minister of Transportation Regulation Number 240 of 2021 (Kementerian Perhubungan, 2021) regulates the operation of high-speed trains in Indonesia. In the regulation it is stated that the railway operation officer must have competence as evidenced by the Proficiency Certificate and Proficiency Identification Certificate issued by the Director General; or Legal entities or institutions that the Minister accredits.

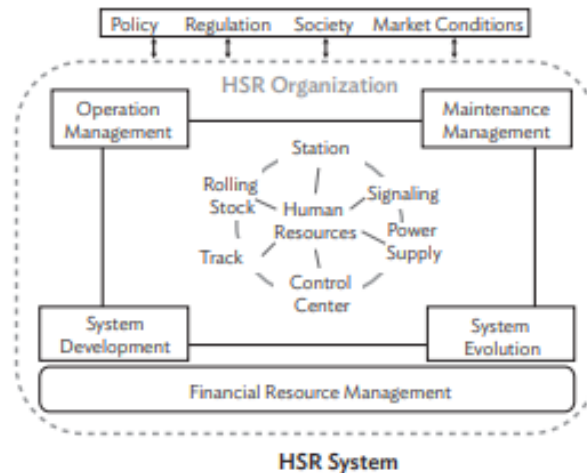


Figure 2. HSR System and Interaction to Be Consider for Implementation (Martha Lawrence, 2019)

HSR Operator's strategy to give the highest priority to customers is to provide safe and reliable services. Increased network length, advanced technology for increasing operating speed while maintaining an impeccable safety record, and reliable service are some of them significant steps taken to maintain HSR's competitiveness. In addition, to support this progress, a competent human resources team at operator and organizational level is also required (Mukoyama and Bugalia 2020).

In accordance with the plan prepared by PT KCIC, HSRCC, and PT KAI, the need for human resources for the operation and maintenance of the Jakarta-Bandung High Speed Train (KCJB) is 1,452 people with predetermined qualification standards. All human resources will be taken from local Indonesian human resources. HR needs will be carried out before the operational plan in 2023 in stages according to the needs and availability of financing. The new technology used both from infrastructure, facilities and operating facilities for the high-speed train has its own challenges because it does not yet exist in Indonesia, so there needs to be a transfer of knowledge regarding the use of technology from experts from the Chinese side, in this case in collaboration with HSRCC.

METHOD

The research method used in this study is a qualitative research method. Qualitative research method is a research procedure that produces descriptive data in the form of written and spoken words from people or observable behavior (Bogdan dan Taylor in Moleong, 2012). The data analysis technique used in this study uses an interactive model. Activities in qualitative data analysis are carried out interactively and continuously until complete, so that the data is saturated. Data analysis activities in this study were carried out through the stages of data

collection, data reduction, data display and conclusion drawing (Miles,M.B, Huberman,A.M, dan Saldana, 2014).

Data collection from High Speed Railway Training literacy study in China through China Railway Beijing, Tianjin Railway Technical and Vocational College, and Southwest Jiaotong University for the availability of High Speed Railway Technology expert trainers, High Speed Railway regulations in Indonesia, observations and interviews with Indonesian High Speed Railway operators KCIC and HSRCC. Data reduction process for preparation the training curriculum purpose is carried out by considering the existing conditions in Indonesia, the focus based on regulations and human resources.

RESULTS AND DISCUSSION

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives (International Organization for Standardization (ISO), 2019) ISO 10015:2019: Quality management - Guidelines for competence management and people development. People development output is competence ability to apply knowledge (human or organizational asset enabling effective decisions and action in context, Source (International Organization for Standardization (ISO), 2018) ISO 30401:2018, 3.25) and skills (Learned capacity to perform a task to a specified expectation, Source ISO 30401:2018, 3.30) to achieve intended results.

External Issues (Indonesian Regulation) Regulation of the Minister of Transportation Number 7 of 2022 (Kementerian Perhubungan, 2022) article 261 describes Human Resources for High Speed Railways including: (a) Railway Infrastructure Operations officers; (b) Railway Facility operation officer; (c) Railway Infrastructure Inspector; (d) Railway Infrastructure Maintenance Personnel; (e) Railway Facilities inspectors; (f) Railway Facilities maintenance personnel; (g) Railway safety officer; and (h) Railway accident handling officer.

Regulatory Requirements Training Provider based on Regulation of the Minister of Transportation Number 7 of 2022 stipulates that railway operating officers must have competence as evidenced by a Certificate of Proficiency and Competency Identification issued by the Director General; or Legal entities or institutions that are accredited by the Minister. Decree of the Minister of Transportation of the Republic of Indonesia Number KM 240 of 2021 concerning Accreditation of Education and Training Institutions for the Indonesian Railway Polytechnic of Madiun, provides accreditation to carry out education and training of railway human resources.

The needs and expectations of the Government that the Jakarta-Bandung high-speed train can start operating in 2023. PT KCIC will gradually increase Human Resource (HR) competencies by adjusting Strategic Objectives, Range of Activities or Services, and Resource Availability in 2022. Phase I Training Program will accommodate 500 Participants from the

total HR needs of PT KCIC are 1,452 people. The focus is on increasing competence on the Operation System, Passenger Service, and Maintenance divided into 21 Training Posts as follows:

Table 1. Indonesian High Speed Railway Training Post (KCIC 2022)

No	System	Name Post	Training Post
1	Operation	YWP-YS-JW-01	EMU driver
2		YWP-YS-DD-01	OCC
3	Passenger Service	YWP-YS-KY-01	On-call ER
4		YWP-YS-KY-02	Passenger service (at station)
5		YWP-YS-KY-03	Passenger service (on-train)
6		YWP-YS-KY-04	Water filling
4	Fixed Assets Maintenance	YWP-SW-GW-01	Line maintenance
5		YWP-SW-GW-02	Bridge and tunnel maintenance technician
6		YWP-SW-GW-03	Rail car operator
7		YWP-SW-GW-04	Heavy track maintenance machinery driver
8		YWP-SW-GW-05	Rail flaw detection technician (EMU flaw detection)
9		YWP-SW-XH-01	CTCS on-board signaling equipment maintenance
10		YWP-SW-XH-02	Control center signaling equipment maintenance
11		YWP-SW-XH-03	Site signaling equipment maintenance
12		YWP-SW-TX-01	Communication network management
13		YWP-SW-TX-02	Communication comprehensive maintenance
14		YWP-SW-TX-03	On-board communication equipment maintenance
15	YWP-SW-GD-01	OCS maintenance	
16	YWP-SW-GD-02	Electric powerline maintenance	
17	YWP-SW-GD-03	Sub-station and distribution system equipment inspection and maintenance	
18	YWP-SW-GD-04	OCS vehicle operator	
19	EMU Maintenance	YWP-SW-DC-01	EMU machinist (power-distributed in-depot)
20		YWP-SW-DC-02	EMU machinist (power-distributed on-board)
21		YWP-SW-DC-03	Rail welding flaw detection technician

Most of the participants came from Fresh Graduates who entered the Entry Level, and some came from former PT KAI employees who generally did not know about High Speed Railway Technology. In general, participants are entry level for High Speed Railway Technology knowledge. Fast Train Trainers do not yet exist in Indonesia, so there needs to be a transfer of knowledge from the HSRCC. Regarding the competence ability to apply knowledge and skill, the availability of practice facilities for High Speed Railway Technology is not yet ready, waiting for the completion of the construction project. Required Competence Levels ability to apply knowledge and skill High Speed Railway Technology. The technical executive level is required for the operation and maintenance of the Type KCIC400AF High Speed Train for Electric Multiple Units (EMU) from China. High Speed Railway training need expert trainer for EMU KCIC400AF Operation, Maintenance and Fixed Assets Maintenance.

The readiness and availability of High-Speed Railway Technology expert trainers in Indonesia are not yet available, (Jin et al., 2017) from China Academy of Railway Sciences, Beijing China, foreign aid training led by Ministry of Commerce, is an governmental level human resource development project for under-developed or developing countries, and can be

mainly divided into advanced study and training for officials, technical training, short-term personnel exchange, and etc. Foreign aid training is taken as an reference for international training, especially to developing and underdeveloped countries, so the Indonesian Railways Polytechnic Madiun (PPI Madiun) cooperates with China Railway Beijing, Tianjin Railway Technical and Vocational College, and Southwest Jiaotong University for the availability of High Speed Railway Technology expert trainers. Gaps participant competence between existing competence levels and required competence levels calculate 100%, thus the training program will be carried out as a whole in accordance with the training curriculum of the HSRCC. The challenge of language differences is one of the things that becomes a concern in the preparation of the training implementation time and the training methods used. With the language interpretation stage, a multiplier coefficient of 2.5 is obtained from normal lesson hours in the HSRCC curriculum if it is implemented in Indonesian participants. The calculation of the lesson hours is as follows:

Table 2. Timing and Scheduling Requirements (KCIC 2022)

No	Training Post	Training Hour				Class	Participant
		Indonesian regulation	Professional knowledge	Safety & regulation	Practical skill		
1	EMU driver	8	660	150	508	2	70
2	OCC	8	605	159	160	1	30
3	On-call ER	8	360	159	144	1	30
4	Line maintenance	8	475	190	184	1	30
5	Bridge and tunnel maintenance technician	8	440	210	208	1	23
6	Rail car operator	8	360	200	136	1	4
7	Heavy track maintenance machinery driver	8	550	180	294	1	19
8	Rail flaw detection technician (EMU flaw detection)	8	705	140	384	1	19
9	CTCS on-board signaling equipment maintenance	8	430	180	180	1	11
10	Control center signaling equipment maintenance	8	465	190	190	1	11
11	Site signaling equipment maintenance	8	405	190	156	1	30
12	Communication network management	8	1,105	140	532	1	11
13	Communication comprehensive maintenance	8	585	140	248	1	30
14	On-board communication equipment maintenance	8	435	140	202	1	12
15	OCS maintenance	8	320	220	264	1	30
16	Electric powerline maintenance	8	350	220	264	1	30
17	Sub-station and distribution system equipment inspection and maintenance	8	310	220	270	1	24
18	OCS vehicle operator	8	370	140	140	1	22
19	EMU machinist (power-distributed in-depot)	8	500	190	240	1	30
20	EMU machinist (power-distributed on-board)	-	100	-	64	1	30
21	Rail welding flaw detection technician	8	285	180	228	1	4
Participants							500

Competence needs that have been identified should be related to the development of people. Gaps such as foreseeable future competence requirements should be identified and planned for. This training development should be related to: Competence Levels ability to apply knowledge and skill High Speed Railway Technology. Technical executive level for High Speed Railway operation and maintenance for Electric Multiple Unit (EMU) KCIC400AF Type from China. Determine specific development objectives from Entry Level to Technical Executive Level for High Speed Railway operation and maintenance with High Speed Railway Technology Training (21 Training Post). Select an appropriate provider High Speed Railway operation and maintenance Indonesian railway polytechnic cooperate with China Railway Beijing, Tianjin Railway Technical and Vocational College and Southwest Jiaotong University. Cooperation contacts for training implementation have been made and are scheduled to start in October 2022. Monitor and evaluate the development outputs are carried out based on the curriculum standards from the HSRCC cooperate, so that the Indonesian Railway Polytechnic will receive the evaluation results to be reported.

The target audience is the PT KCIC entry level employee for Operation System, Passenger service, Fixed Assets Maintenance and EMU Maintenance. In 2023, development objectives should be achieved so that it will start in October 2022 because the duration of training ranges from 1 month to 8 months depending on the type of training post, so the target is when the noble fast train is operated, the theoretical training class has been completed and can continued with the practical activities of the training program at the operating facility. The training program consists of 4 parts consisting of (1) Indonesian regulation, instructors from Indonesian Railway Polytechnic; (2) Professional Knowledge, instructor from Tianjin Railway Technical and Vocational College and Southwest Jiaotong University; (3) Safety & regulation, instructor from China Railway – Beijing; and (4) Practical skills instructor from China Railway – Beijing. The delivery method uses the online class method which will be accompanied by interpreters and assistant lecturers in each class.

The training implementation method is divided into two consist of (1) Operation and Passenger Service for Indonesian regulation class, Professional Knowledge, and Safety and regulation carried out in Madiun, Indonesia while Practical skills are carried out in Jakarta-Bandung high-speed train operation facilities; (2) Fixed Assets Maintenance and EMU Maintenance as a whole is carried out in Bandung, Indonesia. The implementation of the training activities will begin in October 2022 and end in accordance with the provisions for the number of lesson hours in each Post Training. The duration of the training implementation is as follows:

Table 3. Training Duration (KCIC 2022)

No	Training Post	Training Hour				Duration	
		Indonesian regulation	Professional Knowledge	Safety & regulation	Practical skill		
1	EMU driver	8	660	150	508	8.50	month
2	OCC	8	605	159	160	6.00	month
3	On-call ER	8	360	159	144	4.50	month
4	Line maintenance	8	475	190	184	5.50	month
5	Bridge and tunnel maintenance technician	8	440	210	208	5.50	month
6	Rail car operator	8	360	200	136	4.50	month
7	Heavy track maintenance machinery driver	8	550	180	294	6.50	month
8	Rail flaw detection technician (EMU flaw detection)	8	705	140	384	8.00	month
9	CTCS on-board signaling equipment maintenance	8	430	180	180	5.00	month
10	Control center signaling equipment maintenance	8	465	190	190	5.50	month
11	Site signaling equipment maintenance	8	405	190	156	5.00	month
12	Communication network management	8	1,105	140	532	11.50	month
13	Communication comprehensive maintenance	8	585	140	248	6.00	month
14	On-board communication equipment maintenance	8	435	140	202	5.00	month
15	OCS maintenance	8	320	220	264	5.00	month
16	Electric power line maintenance	8	350	220	264	5.50	month
17	Substation and distribution system equipment inspection and maintenance	8	310	220	270	5.00	month
18	OCS vehicle operator	8	370	140	140	4.00	month
19	EMU machinist (power-distributed in-depot)	8	500	190	240	6.00	month
20	EMU machinist (power-distributed on-board)	-	100	-	64	1.00	month
21	Rail welding flaw detection technician	8	285	180	228	4.50	month

The training program uses the curriculum from Tianjin Railway Technical and Vocational College and Southwest Jiaotong University and China Railway – Beijing, so that the evaluation and assessment process is based on the standards applicable to the three agencies. Recognition of expertise competence is carried out by the Indonesian Ministry of Transportation (MoT) in accordance with the legislation in force in Indonesia.

Determining Future Competence and People Development Needs, training in emerging knowledge and technological advances; positive impact on organizational mission, vision, values, and culture; both from PT KCIC and PPI Madiun. The next competency requirement is High-Speed Railway trainer from Indonesia. With the stipulation, which was conveyed by the HSRCC, that participants who have taken the training phase I and received an evaluation score of training and competency certification above the average of other participants are able to take

part in the Training of Trainers for High-Speed Railway and pass the Competency Test of Trainer Candidates.

CONCLUSION

PT KCIC will gradually increase Human Resource (HR) competencies by adjusting Strategic Objectives Most of the participants came from Fresh Graduates who entered the Entry Level, Gaps participant competence between existing competence levels and required competence levels calculate at 100%, With the language interpretation stage, a multiplier coefficient of 2.5 is obtained from normal lesson hours in the HSRCC curriculum. Competence Levels ability to apply knowledge and skill in High-Speed Railway Technology. The focus is on increasing competence in the 21 Training Posts as follows Operation System (2 post-training), Passenger Service (4 post-training), Fixed Assets Maintenance (12 post-training), and EMU Maintenance (3 post-training)

Indonesian Railway Polytechnic of Madiun as the executor of HSR training in Indonesia runs the training program consists of 4 parts consisting of (1) Indonesian regulation, instructors from Indonesian Railway Polytechnic; (2) Professional Knowledge, instructor cooperates with Tianjin Railway Technical and Vocational College and Southwest Jiaotong University; (3) Safety & regulation, instructor cooperates with China Railway – Beijing; and (4) Practical skills instructor cooperates with China Railway – Beijing. The delivery method uses the online class method which will be accompanied by interpreters and assistant lecturers in each class. Recognition of expertise competence is carried out by the Safety Directorate of the Indonesian Ministry of Transportation (MoT) in accordance with the legislation in force in Indonesia. The provisions conveyed by HSRCC, participants who have taken the training phase I and received an evaluation score of training and competency certification above the average of other participants are able to take part in the training of trainers for high-speed railway and pass the competency test of trainer candidates.

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