# High Speed Railway Operations Expert Development in Indonesia with ISO 10015:2019

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**Abstract.** KCIC Phase I Training Program focus is on increasing competence on the Operation System, Passenger Service, and Maintenance 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 High Speed Railway Technology. Technical executive level for High Speed Railway operation and maintenance for Electric Multiple Unit (EMU) KCIC400AF Type from China. 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 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. 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 duration of the training implementation about 1 – 8.5 Month. The next competency requirement is High Speed Railway trainer from Indonesia. With the stipulation, which was conveyed by the HSRCC, the lecture who have taken the training phase, 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 · ISO 10015 · Human Development

## 1 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.


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**Fig. 1.** KCIC400AF in production at the Qingdao Sifang CRRC factory

### 1.1 Construction Progress and Operational Supporting Facilities

According to Presidential Regulation No. 3 of 2016, 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 namely 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 at the same time 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 (Fig. 1).

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.

### 1.2 Organizers of Human Resources Training for High Speed Trains in Indonesia

Minister of Transportation Regulation Number 7 of 2022 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 are accredited by the Minister.

### 1.3 Human Resource Needs for Operation and Maintenance of HSR in Indonesia

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.

## 2 Research 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 (Bodgan and Taylor in Moloeng, 2013: 4). 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 and Huberman in Sugiyono, 2013:334).

## 3 Discussions

### 3.1 International Standard Quality Management Guidelines for Training

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives. BS 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 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.

### 3.2 Determining Competence Needs

**Organizational Competence.** External Issues (Indonesian Regulation) Regulation of the Minister of Transportation Number 7 of 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.

**Internal Factors, Needs, and Expectations of Relevant Interested Parties.** 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):

**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 |
| 7 | Fixed Assets Maintenance | YWP-SW-GW-01 | Line maintenance |
| 8 | | YWP-SW-GW-02 | Bridge and tunnel maintenance technician |
| 9 | | YWP-SW-GW-03 | Rail car operator |
| 10 | | YWP-SW-GW-04 | Heavy track maintenance machinery driver |
| 11 | | YWP-SW-GW-05 | Rail flaw detection technician (EMU flaw detection) |
| 119 | | YWP-SW-XH-01 | CTCS on-board signaling equipment maintenance |
| 12 | | YWP-SW-XH-02 | Control center signaling equipment maintenance |

(*continued*)

**Table 1.** (*continued*)

| No | System | Name Post | Training Post |
|---|---|---|---|
| 13 | | YWP-SW-XH-03 | Site signaling equipment maintenance |
| 14 | | YWP-SW-TX-01 | Communication network management |
| 15 | | YWP-SW-TX-02 | Communication comprehensive maintenance |
| 16 | | YWP-SW-TX-03 | On-board communication equipment maintenance |
| 17 | | YWP-SW-GD-01 | OCS maintenance |
| 18 | | YWP-SW-GD-02 | Electric powerline maintenance |
| 19 | | YWP-SW-GD-03 | Sub-station and distribution system equipment inspection and maintenance |
| 20 | | YWP-SW-GD-04 | OCS vehicle operator |
| 21 | EMU Maintenance | YWP-SW-DC-01 | EMU machinist (power-distributed in-depot) |
| 22 | | YWP-SW-DC-02 | EMU machinist (power-distributed on-board) |
| 2.1 | | YWP-SW-DC-03 | Rail welding flaw detection technician |

### 3.3 Assessing Current Competence and Development Needs

**Consider Existing Competence Levels.** 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.

**Compare These with Required Competence Levels.** Required 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. High Speed Railway training need expert trainer for EMU KCIC400AF Operation, Maintenance and Fixed Assets Maintenance.

**Use Risk-Based Thinking to Prioritize Actions to Address Competence Gaps.** The readiness and availability of High-Speed Railway Technology expert trainers in Indonesia are not yet available, 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):

**Table 2.** Timing and Scheduling Requirements (KCIC 2022)

| No | Training Post | Training Hour | | | | Class | Participant |
|---|---|---|---|---|---|---|---|
| | | A | B | C | D | | |
| 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 |

(*continued*)

**Table 2.** (*continued*)

| No | Training Post | Training Hour | | | | Class | Participant |
|---|---|---|---|---|---|---|---|
| | | A | B | C | D | | |
| 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 |

### 3.4 Competence Management and Human Resource Development

**General.** 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.

**Planning.** 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.

**Programme Structure.** 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 & 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):

**Table 3.** Timing Duration (KCIC 2022)

| No | Training Post | Training Hour | | | | Duration | |
|---|---|---|---|---|---|---|---|
| | | A | B | C | D | | |
| 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 |

(*continued*)

**Table 3.** (*continued*)

| No | Training Post | Training Hour | | | | Duration | |
|---|---|---|---|---|---|---|---|
| | | A | B | C | D | | |
| 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.

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