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Effectiveness of Aerodrome Controller Refresher Training To Maintain Competency of Aerodrome Controllers

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ABSTRACT

The training effectiveness is an assessment of degree to which training can enhance knowledge, skills, and attitudes of participants in alignment with the training objectives. Furthermore, assessing training effectiveness also encompassed evaluating the training program itself. The aim of this study is to investigate effectiveness of Aerodrome Controller Refresher Training in order to maintain competency of Aerodrome Controllers. CIPRL (context, input, process, reaction, and learning) was an evaluation model used in this study. Variables assessed in the context were policies and training objectives. Variables assessed in the input were training materials and training facilities. Variable assessed in the process was the training process, consists of training preparation, implementation, and evaluation. Variable assessed in the reaction was the satisfaction of training participants. Finally, variable assessed in the learning was the score of the training participants. The results of this study were indicated that all variables investigated align with established standards, leading to conclusion that the training has been carried out effectively and has successfully met the goal. To maintain the competency of aerodrome controllers was the primary goal of this training. Some recommendations were provided to enhance the effectiveness of Aerodrome Controllers Training.

Keywords: Aerodrome Controller, Refresher Training, Training Effectiveness.

A. INTRODUCTION

The foundation for sustainable progress within the civil aviation industry heavily relies on ensuring the safety of air traffic control operations (Liu et al., 2023). The responsibilities of air traffic control services encompass the following: (1) Preventing aircraft collisions, both in the air and within the airport manoeuvring area, (2) Safeguarding against collisions between aircraft and other vehicles or obstacles within the airport manoeuvring area, (3) Managing airborne traffic in a manner that is safe, organized, and expeditious while minimizing unnecessary aircraft noise, (4) Offering valuable guidance and information to facilitate the smooth and orderly execution of flights, including pertinent advice and data, and (5) Initiating communication with the appropriate organizations when an aircraft requires assistance, such as in search and rescue situations, and providing support to these entities (Bergner & Hassa, 2012).

International Civil Aviation Organization (ICAO) regulations outlines that Air Traffic Service consist of three core functions: Air Traffic Control Service, Flight Information Service, and Alerting Service. Moreover, Air Traffic Control Service can be further categorized into three distinct segments, which are Area Control Service (ACC), Approach Control Service (APP), and Aerodrome Control Service (ADC) (ICAO, 2018). The Aerodrome Control Service shall be provided by an Aerodrome Control Tower, which is responsible for furnishing guidance and authorization to aircraft within its jurisdiction. Its primary objective is to ensure the secure, organized, and seamless flow of air traffic in and around aerodrome, with the goal of averting potential collisions between: (1) aircraft within the specified aerodrome control tower area, including aerodrome traffic circuits, (2) aircraft operating in the manoeuvring area, (3) aircraft in landing and taking off phase, (4) aircraft and vehicles operating in the manoeuvring, and (5) aircraft and obstructions within the manoeuvring area (ICAO, 2016).

Air Traffic Controllers (ATCs) are required to make quick decisions to ensure the safety of air traffic (Wang et al., 2021). Air Traffic Management is intricate and places substantial demands on air traffic controllers, leading to elevated stress levels (Rodrigues et al., 2018). The growing volume of air traffic results in ATCs working under significant loads or even overloads for extended durations, which can detrimentally affect the reliability and efficiency of their directives (Yang et al., 2023). Furthermore, the escalating air traffic leads to increased congestion in controlled airspace and a rise in accidents stemming from human error (Moon et al., 2011). Based on data provided by Boeing, a significant 60% of global commercial aircraft accidents took place during the phases of take-off, initial climb, approach, and landing within the time frame of 2007 to 2016, representing a substantial safety concern for air transportation

(Zeng et al., 2021). Human error forms the predominant factor, contributing to approximately 70% to 80% of all aviation accidents in a causal sequence (Sant'Anna & Hilal, 2021). The incident report identified 17 areas of risk, including aspects related to aircraft operations, human factors in control procedures, and the operational condition of sectors or airspace and structures. Human factors, along with operational regulations and procedures, emerge as the primary catalysts for these incidents(Liu et al., 2023).

The growing volume of incoming aircraft movements at airports leads to an increased level of complexity and demand in air traffic management. Consequently, there is a heightened necessity to understand the interplay of factors influencing the performance of ATCs (Bongo & Seva, 2022). Among these factors, training stands out as a crucial one. It's essential to recognize that service-oriented entities like airlines derive value from performance, and effective performance hinges on comprehensive training methodologies (Gibbs et al., 2017). Research has demonstrated that enhancing job satisfaction can lead to higher employee productivity. In the aviation industry, several established methods for increasing job satisfaction include fostering a positive work environment, implementing reward and recognition systems, nurturing employee skill development, and continuously assessing and gauging employee job satisfaction. Employee development approaches like training and education can also play a pivotal role in elevating job satisfaction (Isnanto, 2021).

Refresher training for ATCs is to provide them with the necessary skills and knowledge required to effectively tackle the various challenges presented by emergency situations and unusual conditions (Malakis & Kontogiannis, 2012). Recognizing the significance of sustaining performance of ATCs through training, the Center for Human Resources Development on Civil Aviation (CHRDCA) introduced the ICAO Standardized Training Package (STP) Aerodrome Controller Refresher in 2014. Since its inception, this training program has been conducted in five batches. First batch of training was held from December 11 to 23 in 2014. Second batch was held from November 2 to 13, 2020. Third and fourth batches were held in collaboration with the Gulf Center for Aviation Studies (GCAS) in Dubai. Third batch was held from May 29 to June 9, 2023, and fourth batch was held from June 12 to 23, 2023. Fifth batch was held in Indonesia from August 21 to September 1, 2023. It was the first batch of training that was hosted by CHRDCA and the first to use the reviewed ICAO STP. Review and update of this ICAO STP was carried out in January 2023 in cooperation between CHRDCA and Airnav Indonesia.

An assessment of training effectiveness fundamentally involves appraising the extent to which training enhances the competencies, knowledge, and attitudes of employees within an

organization. Perceptions of training effectiveness are shaped by various factors encompassing pre-training, training, post-training phases, as well as personal attributes (Manna & Biswas, 2021). Evaluation, on the other hand, is a systematic process for gauging the efficiency of a course, workshop, or briefing, employing criteria established by a predefined set of standards (FAA, 2020). Although the terms "training evaluation" and "training effectiveness" are at times used interchangeably, they represent distinct concepts. Training evaluation is a measurement technique that assesses the degree to which a training program attains its intended objectives. The specific evaluation measures employed are contingent on these objectives and might involve scrutinizing training content, design, learner development, and the organizational advantages it yields. Training effectiveness, in addition to assessing the outcomes of training, also examines various aspects of the training environment, program, and employees that contribute to its success or lack thereof (Alvarez et al., 2004). Therefore, assessing training effectiveness involves an evaluation of the training itself.

In the context of commercial aircrew training, the assessment of subordinate training and procedures, such as inspection, testing, and assessment, can manifest in various ways. There are four significant categories of training evaluation that hold regulatory importance, namely: (1) curriculum-based evaluation, (2) process evaluation, (3) system evaluation, and (4) evaluation of training effectiveness (Sonnenfeld et al., 2023). Currently, four evaluation models are in widespread use, each offering distinct approaches based on different theories. These models encompass Experimental or Quasi-experimental approaches to evaluation, Kirkpatrick's approach, the Logic model, and the Context/Input/Process/Product (CIPP) model (Frye & Hemmer, 2012), providing diverse perspectives on the evaluation process.

In 1960, Kirkpatrick introduced the training evaluation model, which consists of four distinct levels. These levels are identified as: reaction, learning, behaviour, and result (Nawaz et al., 2023). Level 1, known as "Reaction," assesses the responses of individuals who take part in the training program, essentially measuring customer satisfaction. Level 2, "Learning," gauges the changes in attitudes and the increased knowledge and skills acquired by participants as a result of their participation in the training program. Level 3, "Behaviour," quantifies the alterations in behaviour that arise from participants' participation in the training program. Level 4, "Result," evaluates the ultimate outcomes that stem from participants' participation in the training program. These outcomes might encompass heightened production, enhanced quality, cost reduction, a decrease in the frequency and severity of accidents, increased sales, and augmented profits (Kirkpatrick & Kirkpatrick, 2008).

While there are both advantages and disadvantages to various program evaluation models when it comes to assessing training activities, research indicates that the Kirkpatrick program evaluation model is more suitable than other models (Heydari et al., 2019). Kirkpatrick's evaluation model simplifies the assessment of training effectiveness to a significant extent. However, it fails to account for individual and contextual factors in the evaluation of training. It is essential to recognize that evaluating the effectiveness of training should also take into consideration the attributes of the organization, the work environment, and the individual characteristics of each training participant, all of which serve as critical input factors. Furthermore, research has revealed that the sufficiency of material resources such as equipment and supplies can impact the effectiveness of training processes and outcomes (Bates, 2004). Therefore, it will be more effectively to collaborate the Kirkpatrick's evaluation model with the other model.

The CIPP evaluation model, formulated by Daniel Stufflebeam in 1966, serves as a comprehensive framework for program assessment. Context evaluation is employed to offer logical justifications for the selection of a particular program. On a broader scale, this context evaluation can encompass an examination of program objectives, the policies that support the program, the relevant environment, the identification of needs, opportunities, and the diagnosis of specific issues. Input evaluation aims to provide information about the resources that can be harnessed to attain program goals. Process evaluation furnishes insights into the execution process of a program. Product evaluation supplies information about the attainment of program objectives (Warju, 2016). The CIPP model can offer a genuine understanding of the conditions prevalent in programs implemented within vocational education and serve as a foundation for proposing remedies for the challenges encountered in the model's four dimensions. Nevertheless, some limitations have been observed where evaluators have struggled to conduct in-depth analyses of the issues requiring rectification and to provide solutions, which has rendered the evaluation stage somewhat superficial in its approach to the program's implementation (Ratnaya et al., 2022).

B. METHOD

The aim of this study is to investigate the effectiveness of Aerodrome Controller Refresher Training in order to maintain competency of Aerodrome Controllers. To evaluate training effectiveness, a hybrid evaluation model is employed, which combines elements from both the Kirkpatrick and CIPP models, while excluding overlapping variables and those that cannot currently be assessed. Since the product evaluation in the CIPP model closely resembles the

four level in the Kirkpatrick model, it is omitted. Moreover, given that the training program has just been implemented, and most of the training participants have yet to assume their roles as Aerodrome Controllers, evaluations at level three and four in the Kirkpatrick model are not feasible at this stage. Consequently, in this study, the evaluation phase is referred to as CIPRL (context, input, process, reaction, and learning). In each phase, there are one to two variables being studied, and various data collection methods are employed, as shown in following table:

Table 1. Evaluation Variable and Data Collection Method

Evaluation Stage	Evaluation Variable	Data Collection Method
Context	Policies Training objectives	Interviews and documents observation
Input	Training materials Training facilities	Interviews and documents observation
Process	Training processes	Interviews and documents observation
Reaction	Training participants satisfaction	Documents observation
Learning	Training participants score	Documents observation

This study focuses on the fifth batch of Aerodrome Controller Refresher training, which marks the inaugural use of ICAO STP Aerodrome Controller Refresher that has undergone review and update. This batch was hosted by CHRDCA. The number of participants was 18 persons, which consisted of 6 persons from CHRDCA, 11 persons from the Indonesian Aviation Polytechnic, and 1 person from Airnav Indonesia. The study involved interviews with the ICAO STP Aerodrome Controller Refresher Administrator and the Human Resources Development Division of Airnav Indonesia.

C. RESULTS AND DISCUSSIONS

1. Policies

Directorate General of Civil Aviation (DGCA) in the Republic of Indonesia Ministry of Transportation approved the Manual of Standards Part 69-01 (MOS 69-01) in 2009, with the most recent revisions made in August 2022. MOS 69-01 encompasses various regulations, including those pertaining to the refresher training for ATCs. Continuation training, as outlined in MOS 69-01, pertains to the education and training provided to air navigation personnel with the objective of refreshing their fundamental knowledge and skills in alignment with the scientific disciplines relevant to air navigation services. This type of training includes both theoretical and practical components and is required to be completed at least once every three years. Continuation training consists of aerodrome control refresher training, approach control

procedural refresher training, area control procedural refresher training, approach control surveillance refresher training, and area surveillance refresher training (DGCA, 2022). Therefore, MOS 69-01 represents a policy that supports the implementation of the ICAO STP Aerodrome Controller Refresher program.

Policies and regulations mandating continuation training every three years have been established, but Airnav Indonesia has not effectively put them into practice. Airnav Indonesia oversees approximately 1,700 ATCs. Assuming that one-third of this total participates in continuation training each year, this would amount to 550 participants. However, Airnav Indonesia faces several obstacles, including budget constraints, especially exacerbated by the financial impact of the global Covid-19 pandemic, which has significantly affected the aviation industry and is yet to fully recover. Additionally, there is a limitation in operational personnel as some staff have to attend training. However, to maintain optimal ATCs performance, Airnav Indonesia employs several strategies. First, Airnav Indonesia adheres to the regulations set out in MOS 69-01, which dictate that an ATCs must hold a rating to be eligible for work. To obtain an Aerodrome Control Tower rating, ATCs are required to participate in On-the-Job Training (OJT) under the guidance of an OJT instructor for a period of 90 hours, which is equivalent to one month. Additionally, they must pass a rating test administered by the ATCs Checker to qualify for the rating. Furthermore, all ATCs are subject to a rating renewal exam every six months. Second, Airnav Indonesia conducts regular outreach and training sessions to keep personnel informed about changes in regulations, systems, or standard operating procedures.

2. Training Objectives

Details about the ICAO STP Aerodrome Controller Refresher can be accessed through the following web portal: https://igat.icao.int/ated/TrainingCatalogue/Course/146. The primary goal of this training is to ensure that aerodrome controllers maintain and reinforce their knowledge, skills and attitudes on a regular basis, so that they will be able to control air traffic within aerodrome effectively and efficiently in accordance with ICAO Standards and Recommended Practices (SRAPs) and national regulations. Competence is typically described as a combination of cohesive elements, encompassing knowledge, skills, and attitudes (Baartman & De Bruijn, 2011). Therefore, the primary goal of this training is to maintain and reinforce the competency of aerodrome controllers.

The learning objective of this training is that upon its completion, training participants will be able to control aircraft in the manoeuvring area, control traffic other than aircraft in the

manoeuvring area, control VFR (Visual Flight Rules) flights, control IFR (Instrument Flight Rules) flights, and manage traffic in abnormal conditions. The document with more comprehensive information regarding the ICAO STP Aerodrome Controller Refresher has obtained from the ICAO STP Aerodrome Controller Refresher administrator. Within this ICAO STP document, a module plan form reveals that the training is structured into four modules. Module 0-Course Introduction is a module that includes an explanation of course administration, course objectives, course structure, course methods as well as tests and evaluations. In the meantime, Modules 1 to 3 are equipped with titles, a final module objective, and intermediate objectives, as shown in table 2.

Table 2. Module Objectives

Module No. & Title	End-of-Module Objective	Intermediate Objectives
Module 1 - Control Traffic on Manoeuvring Area	Condition: In the aerodrome simulator, given a scenario of traffic (aircraft and other than aircraft) on manoeuvring area. Performance: Control traffic on the manoeuvring area. Standard: In accordance with ICAO Annex 2; ICAO Annex 10 Vol. II, ICAO Annex 11; ICAO Doc 4444; and Local SOPs.	- Pass departure information if required; - Deliver ATC clearance/instruction for Departure; - Approve start-up engine and push back; - Issue taxi instructions; - Monitor/follow-up traffic; - Transfer to Tower Controller; - Accept transfer arrival from tower controller; - Coordinate with Apron Movement Control (AMC) if required; - Receive requested permission for entering/vacate manoeuvring area; - Issue Instruction according to the situation.
Module 2 - Control Traffic in the Vicinity of Aerodrome	Condition: In the aerodrome simulator, given a scenario of traffic within the vicinity of aerodrome. Performance: Control traffic in the vicinity of aerodrome. Standard: In accordance with ICAO Annex 2; ICAO Annex 10 Vol. II, ICAO Annex 11; ICAO Doc 4444 and Local	- Control VFR flights departure; - Control VFR flights within circuit; - Control VFR flights arrival; - Control SVFR flights; - Control IFR flights departure; - Control IFR flights arrival.

	SOPs.	
Module 3 - Abnormal Conditions	Condition: In aerodrome simulator, given scenario of the abnormal traffic condition. Performance: Manage traffic in abnormal condition. Standard: In accordance with ICAO Annex 2, ICAO Annex 10 Vol. II, ICAO Annex 11, ICAO Doc 4444 and Local SOPs	- Take appropriate action in case of unusual situations; - Take appropriate action in case of emergency situations; - Take appropriate action in the event of equipment degraded situation.

ICAO STPs development in the worldwide follows a consistent methodology, consist of seven stages: stage 1 (preliminary study), stage 2 (job analysis), stage 3 (population analysis), stage 4 (curriculum design), stage 5 (module design), stage 6 (production), and stage 7 (validation and revision). Following this, the training is implemented. All ICAO STPs feature course goals, learning objectives, end-of-module objectives, and intermediate objectives. Details about the course goals and learning objectives of any training program are readily accessible in each ICAO training brochure or catalogue. This accessibility enables prospective training participants to gauge whether the training's objectives align with their specific needs. Furthermore, information about end-of-module objectives can be found within each training module, thereby informing training participants about the competencies they are expected to achieve in each module. The clarity of learning objectives significantly influences the effectiveness of the training. Prior research has underscored the importance of aligning assessments with specified learning objectives. In academia, learning objectives are used to structure instruction, and students rely on them to prepare for assessments (Barnard et al., 2020).

3. Training Materials

ICAO STP comprises various documents, including guidance forms for training administrators and instructors, training materials (handouts and PowerPoint presentations), exercise questions, mastery test questions, and assessment guides. The guidance forms for administrators and instructors encompass course content, course description, course facilities, instructor timetables, and module plans. The content of the training material in each module is meticulously designed to facilitate the attainment of intermediate objectives, ultimately leading to the achievement of end-of-module objectives. The training also incorporates exercises and mastery tests, with each module featuring one exercise and one mastery test. These exercises and mastery tests involve direct practice within the aerodrome simulator, where training

participants are presented with specific scenarios to complete. Importantly, each country employing the ICAO STP is authorized to develop its own scenarios for use in the aerodrome simulator. This flexibility aims to ensure that the scenarios created align with the specific conditions of each country and the available simulators. Assessment guides for both practices and mastery tests are also provided. Prior research has demonstrated that training materials and methodologies exert a substantial influence on training effectiveness (Ambarita et al., 2022). Therefore, it can be concluded that the Aerodrome Controller Refresher training has been effectively conducted, given the completeness of the training material provided and its alignment with the training objectives.

Both instructors and training participants have offered several suggestions. First, there is a need to review module 3 and include additional information about various types of emergency situations. Secondly, it is recommended that the training duration of ten days (two weeks) be shortened to enhance its effectiveness. Furthermore, it is advised to review the presentation materials to better align them with the exercises provided. In accordance with ICAO Global Aviation Training (GAT) policy, every STP is required to undergo a review every three years. These reviews may result in either minor or major changes, which are then reported to ICAO GAT via the Trainair Plus Electronic Management System (TPEMS) portal at https://igat.icao.int/portal. Subsequently, these changes are subject to validation by ICAO GAT before being put into use. However, despite being established in 2012, the ICAO STP Aerodrome Controller Refresher has undergone just one review in 2023. The CHRDCA faces several challenges, including the absence of specialized units and dedicated personnel to manage the STP, as well as limited budgetary resources for handling ICAO STP documents and modules.

4. Training Facilities

The course facilities form outlines the facilities that need to be arranged by training administrators and instructors, which include an air-conditioned classroom, projector, whiteboard, flip chart, stationary supplies, and an ATC simulator. It is confirmed that all of these facilities can be adequately provided. The ATC simulator holds particular significance in this training, particularly for conducting exercises and mastery tests. The ATC simulator used is the one developed by Airnav Indonesia in the form of a computer simulation. Previous research has also yielded similar findings, emphasizing that computer simulation has evolved into a valuable tool for ATC training, leading to the improvement of ATC skills and, consequently, enhancing

traffic safety (Rodrigues et al., 2018). Simulation is an integral component of the ATCs training process and is presently the sole method available that allows participants to gain hands-on experience in mastering this highly specialized and detail-oriented profession. Despite its undeniable value to the learning experience of ATC trainees, simulations often become outdated or ineffective due to the rapid pace of equipment advancements, which can outstrip an agency's ability to update the simulators. Therefore, training institutions must continually upgrade their simulators to align with the evolving technology used in the field. Additionally, in Indonesia, as per regulations outlined in MOS 69-01, ATC students are mandated to undergo a minimum of three months of On-the-Job Training (OJT) before they are eligible to sit for the licensing exam. This extended OJT duration is deemed adequate to ensure that ATC students' competencies align with the field's requirements.

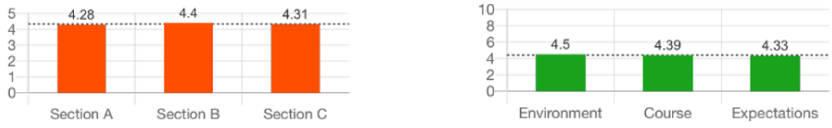
5. Training Processes

The training process being evaluated consists of three stages: preparation, implementation, and evaluation. During the preparation stage, coordination is conducted to determine the training's schedule, instructors, participants, and required facilities. While the CHRDCA hosts this training as the owner of the ICAO STP, the financing is provided by the Indonesian Aviation Polytechnic. Classroom facilities are located at CHRDCA, and the ATC simulator is provided by Airnav Indonesia. Instructors are drawn from Airnav Indonesia and the Indonesian Aviation Polytechnic, and participants come from all three institutions. Consequently, the successful execution of this training necessitates coordination among these three institutions. The implementation stage proceeded smoothly, with instructors following the module plan, and all participants adhering to the specified schedule. During the evaluation stage, two essential tasks are performed: assessing the competency of the training participants and gauging their satisfaction. Hence, it is reasonable to conclude that the training process was effectively conducted.

6. Training Participants Satisfaction

The success of a training program is often determined by the contentment of the participants, as their satisfaction can impact their motivation to learn (Dewi & Kartowagiran, 2018). Furthermore, research has revealed a noteworthy connection between learning satisfaction and the intention to continue learning (Wu et al., 2015). The evaluation of training participant satisfaction encompasses several facets, including contentment with the training

modules, overall training experience, and the effectiveness of the instructor. Each of these aspects comprises multiple questions, with each question employing a 5-point scale where 5 represents "strongly agree," 4 denotes "agree," 3 signifies "neutral," 2 indicates "disagree," and 1 corresponds to "strongly disagree." Based on the training report, the satisfaction of training participants is presented in Fig. 1 and 2.



(a) (b)

Fig. 1. The training participants satisfaction

In Fig. 1a, the evaluation results of training participants satisfaction with the modules. Section A assesses for module structure and mastery test, section B assesses the training activities, and section C assesses the training materials. Fig. 1b illustrates the results of measuring training participants satisfaction with the overall training, which encompasses the training environment, training implementation, and the alignment of the training with participants' expectations. All aspects garnered an average rating exceeding 4, indicating that training participants were satisfy with the training. Fig. 2 illustrates the satisfaction of training participants with the instructor, with an evaluation of three aspects: class management, course delivery, and the instructor's expertise. The training delivered by two instructors, and both received an average rating surpassing 4. This indicates that training participants provided exceptionally positive feedback about their instructors.

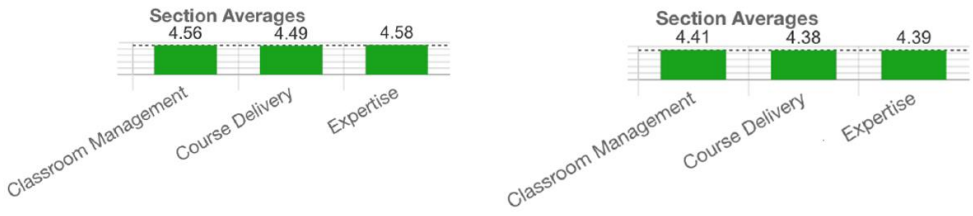
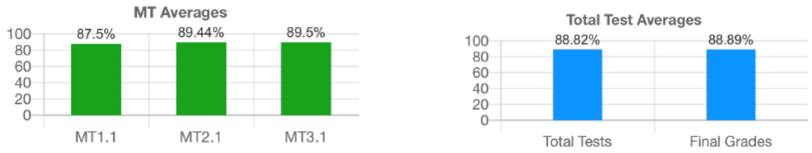


Fig. 2. The training participants satisfaction of the instructors

7. Training Participants Score

The evaluation of training participants competency involves the use of direct practice methods in the ATC simulator. Training participants are presented with specific scenarios and tasked with controlling aircraft. Several aspects are assessed during this process, including separation, control techniques, communication, clarity in filling the flight progress strip, coordination, and work habits. The average score achieved by training participants on the mastery test for each module is presented in Figure 3a, and their final scores are presented in Figure 3b. The overall average score of the training participants was 88.89%. The minimum passing standard for this training is set at 80%. Therefore, all training participants have successfully met this requirement.



(a) (b)

Fig. 3. The training participants score

8. Discussions

Within the context evaluation, two variables are under assessment: policies and training objectives. Firstly, there exists a policy or regulation (MOS 69-01) that mandates continuation training for Aerodrome Controllers at least once every three years. However, the practical implementation of this policy faces challenges. Furthermore, there are no international regulations that require continuation training at this frequency; these regulations are specific to Indonesia. Hence, it is advisable for the DGCA to reassess these regulations in collaboration with operators, notably Airnav Indonesia. This collaborative effort should aim to formulate regulations that accommodate operators' interests while remaining compliant with international aviation navigation regulations. This process aligns with the policy cycle depicted in Fig. 4, where the implementation phase is followed by an evaluation stage, and the outcomes of this evaluation inform the agenda setting for subsequent policy development (Knill & Tosun, 2008). Secondly, the training objectives are clearly defined and communicated to the training participants. This clarity benefits both the instructors and the training participants, allowing them to adequately prepare for the training.

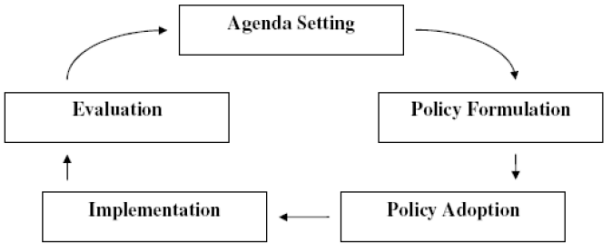


Fig. 4. Policy cycle

In the input evaluation, two variables are assessed: training materials and training facilities. The training materials are found to be comprehensive, including guide forms, training modules, questions, and assessment guides. Similarly, the training facilities meet the necessary requirements. However, it is advisable to periodically review and update the training materials, ideally at least once every three years. This update should not only ensure compliance with ICAO requirements but also consider feedback from instructors and training participants. Likewise, training facilities, especially ATC simulators, must be continually upgraded to align with the latest technological advancements.

Process evaluation focuses on assessing the training process across the preparation, implementation, and evaluation stages, all of which have been executed effectively. Reaction evaluation gauges the satisfaction of training participants with the training module, the implementation of the training, and the instructor, and it is concluded that all training participants expressed satisfaction with the training. Finally, in the learning evaluation, the grades of the training participants are examined, and it is confirmed that all participants successfully completed the training. Based on the evaluation results across context, input, process, reaction, and learning, it can be concluded that the Aerodrome Controller Refresher training has been effective and successfully met its intended goal. To enhance the effectiveness of Aerodrome Controllers Training, there are several recommendations provided, such as:

1. DGCA should evaluate policies and regulations regarding mandatory continuation training every three years, considering operators' interests to ensure proper implementation.
2. CHRDCA should establish a Course Developer Unit (CDU) and allocate a budget to periodically review existing ICAO STPs and develop new ones.
3. CHRDCA, in collaboration with Airnav Indonesia, should regularly upgrade the ATC simulator and update technical scenarios to align with the latest field conditions, ultimately enhancing the effectiveness and realism of the training experiences.

D. CONCLUSION

Based on the assessment results of various variables at each stage of CIPRL, including policies, training objectives, training materials, training facilities, training processes, training participants satisfaction, and training participants score, it can be concluded that the Aerodrome Controller Refresher training has been effective and successfully met its intended goal. Several recommendations are also provided to enhance the effectiveness of Aerodrome Controllers Training.

For future study, it is advisable to expand the evaluation to include levels 3 (behaviour) and 4 (results). This can be achieved by having personnel who work as aerodrome controllers attend the training, and conducting the evaluation several months after the training. This approach will provide valuable insights into behavioural changes and the desired ultimate outcome of the training, which is the enhancement of organizational performance.

E. ACKNOWLEDGMENTS

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