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MANAGEMENT OF THE TECHNICAL TRAINING PROGRAM ON IMPACT-BASED FORECAST AT PPSDM MKG BMKG

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ABSTRACT

This study seeks to investigate the management of the Technical Training Program on Impact-Based Forecast (IBF) at the PPSDM MKG BMKG. The sub-focus of this research encompasses the planning, implementation, and evaluation of the IBF training. Employing a qualitative approach with a descriptive method, data collection techniques were conducted through interviews, observations, and document studies. The informants of this study comprised the head of the administrative subdivision, training organizers, and training evaluators. The findings reveal that the management of the IBF technical training program at PPSDM MKG BMKG has been generally well-implemented, commencing from the planning, implementation, and evaluation stages. The planning of the IBF training program at PPSDM MKG was systematically carried out through needs identification utilizing the ADDIE model and the Learning Committee Meeting forum as the foundation for formulating objectives, which centered on enhancing the capacity of national and provincial weather forecasting, improving service quality, and establishing strategic partnerships with stakeholders. The implementation adopted a coaching approach to facilitate an interactive and practical learning process with high participation levels up to the evaluation stage. The program evaluation was conducted employing the Kirkpatrick model, supplemented by formative and summative evaluations involving participants, trainers, and organizers.

1. INTRODUCTION

In an organization or government institution, the presence of human resources plays a crucial role in determining both success and failure. Human resources also hold an important role in realizing the institution's vision and mission. Therefore, developing the competency of human resources becomes a strategic necessity that must be continuously undertaken in line with the dynamics of technological advancement and organizational needs. In this context, sustainable human resource development emphasizes continuous competency improvement to ensure organizational resilience and long-term institutional performance. I

n the process of developing, improving, and shaping the workforce within an institution, education and training become the primary efforts undertaken. Training, as part of the human resource development process, is an activity designed systematically to enhance an individual's knowledge, skills, and attitudes in performing specific tasks. One relevant theory in this context is Notoatmodjo's theory of training, which explains that training is an effort to develop human resources, particularly in behavioral and intellectual aspects.

Through systematic training, organizations can ensure the continuity and sustainability of employee competencies in facing evolving job demands.

The Meteorology, Climatology, and Geophysics Agency (BMKG) is a non-ministerial government institution responsible for conducting activities in the fields of meteorology, climatology, and geophysics. To optimally perform these duties, BMKG requires human resources with expertise in these fields. Human resource development within BMKG is carried out through a supporting unit—the Center for Human Resource Development for Meteorology, Climatology, and Geophysics (PPSDM MKG), which is responsible for coordination and development in planning, competency development, and quality assurance, including the implementation of pre-service and in-service training in meteorology, climatology, geophysics, and general competencies. As part of employee competency development, PPSDM MKG conducts two types of training: non-technical training and technical training

Based on the Regulation of the Head of the National Institute of Public Administration (LAN) Number 13 of 2011 concerning General Guidelines for the Implementation of Technical Education and Training, technical education and training (Diklat Teknis) are conducted to provide knowledge and/or mastery of skills in job-related fields for civil servants (PNS), enabling them to carry out their duties professionally. One of the technical trainings conducted by PPSDM MKG is the Impact-Based Forecast (IBF) training, which focuses on enhancing forecasters' ability to present weather forecasts based on potential impacts.

The main dimensions of IBF include hazard, exposure, and vulnerability, which collectively form risk-based forecasting (Harrowsmith, 2020). In IBF, the information presented goes beyond stating "the occurrence of rain" and includes predicted potential damages such as flooding or infrastructure disruption, making the information easier for the public and stakeholders to understand. IBF training plays a crucial role considering Indonesia's geographical position between the Indian and Pacific Oceans and between the Asian and Australian continents. This condition makes Indonesia highly vulnerable to extreme weather events that trigger various hydrometeorological disasters. This is supported by disaster data from the National Disaster Management Agency (BNPB), which shows that hydrometeorological disasters—such as floods, landslides, extreme weather, forest fires, and drought—are the most frequent disasters in Indonesia each year. Therefore, strengthening human resource capacity through IBF training becomes a strategic effort to support sustainable disaster risk reduction.

Studies on ASN competency development through education and training have been widely conducted, especially in the context of improving performance and professionalism among government personnel. For instance, research by Irfan Ibrahim (2022) examined the implementation of technical training based on e-learning as part of ASN competency development at the Training Agency of Gorontalo Province. The findings indicate that the strategic plan focuses on increasing non-classical training and can be implemented through three alternative activities: conducting technical training via e-learning, implementing coaching and mentoring, and offering internship programs.

Another study by Triwandes Sinurat and Ridwin Purba (2023), titled The Role of Structural and Technical Training in Improving the Competency of Personnel at the Siantar Education Branch Office of North Sumatra Province, demonstrates that technical training has a significant influence on employee competency. The study also highlights that the success of technical training is determined by understanding, materials, learning tools, implementation, feedback, interaction, and coordination.

Further research by R.R. Yuliana Purwanti (2021), titled Managerial Competency Profile Based on Participants' Perceptions in the 2020 Impact-Based Forecast (IBF) Training, shows that respondents generally perceived themselves as still lacking in managerial and socio-cultural competencies needed to support the role of the IBF team.

Although previous studies have discussed technical training and IBF implementation, most focus on learning outcomes or competency profiles, while limited attention has been given to how the IBF training program is managed comprehensively from planning, implementation,

to evaluation perspectives. This indicates a research gap related to training management as a component of sustainable human resource development within government institutions, particularly in the meteorological sector.

Therefore, this study aims to analyze the management of the Impact-Based Forecast (IBF) technical training program at PPSDM MKG BMKG, focusing on the planning, implementation, and evaluation stages. The findings are expected to contribute to the development of sustainable human resource training practices within BMKG and provide insights for other government training institutions implementing technical training programs.

2. METHODS

This study employs qualitative data using a descriptive method. The data collected consist of facts and actual conditions occurring in the field. The data were gathered from interviews with several informants, documentation studies, and field observations in accordance with the research objectives. The informants in this study include the head of the administrative subdivision, the training implementation committee, and the training evaluation committee. The selection of informants was based on their direct involvement and authority in the planning, implementation, and evaluation of the Impact-Based Forecast (IBF) technical training program at PPSDM MKG BMKG, so that the data obtained were relevant to the research focus. The research was conducted from November 2024 to August 2025. This timeframe refers to the overall research process, starting from preliminary observation, data collection, to data analysis and verification, in accordance with the stages of qualitative research. This study utilizes two types of data sources, namely primary data and secondary data. Informant selection was carried out using two methods: purposive sampling and snowball sampling. The data analysis technique follows the three steps of the Miles and Huberman model: Data Reduction, Data Display, and Conclusion Drawing/Verification. Meanwhile, the validity of the data was tested through credibility, transferability, dependability, and confirmability.

3. RESULTS AND DISCUSSION

3.1 Planning of the Impact-Based Forecast Training Program at PPSDM MKG BMKG

The planning of the Impact-Based Forecast (IBF) training at PPSDM MKG BMKG is carried out in a systematic, participatory, and adaptive manner. Planning serves as an initial stage that plays an important role in the success of training implementation, as stated by Terry and Rue (2019), who describe planning as a process of determining future goals and the steps required to achieve them. The findings of this study show that the IBF training is driven by three main factors, namely regulations, the development of science and technology, and the shift in weather forecasting paradigms. These factors are confirmed by informants, who emphasized that the planning of the IBF training was not incidental but primarily driven by institutional needs and regulatory mandates. The regulatory aspect refers to Law Number 20 of 2023 Article 49, which affirms the obligation of every civil servant to continuously develop their competencies. This provision aligns with Farida (2021), who states that the purpose of training is to improve employees' competencies in the cognitive, affective, and psychomotor domains. Suporting this view, one informant highlighted that compliance with competency development regulations was a key consideration in proposing the IBF training program.

Advances in science and technology in the field of meteorology, climatology, and geophysics require BMKG's human resources to strengthen their capacity in producing information that is fast, accurate, and easy to understand. Meanwhile, the shift from conventional forecasting toward impact-based forecasting reinforces the relevance of this training as a strategic instrument to support hydrometeorological disaster mitigation in Indonesia. Sahir et al. (2023) emphasize that training is necessary to update employees' skills in line with technological developments while preparing them to face changes in the work environment.

The identification of training needs is carried out through the analysis stage of the ADDIE model, facilitated through the Learning Committee Meeting forum. This process reflects the interactive approach as explained by Sugiyanto an approach that emphasizes collaboration between leaders and implementers to align training needs (Fatim, 2020).

As stated by the Head of the Administrative Subdivision of PPSDM MKG, "The model approach we apply is based on ADDIE. At the analysis stage, as the initial phase, PPSDM MKG, as the administrator of the BMKG Corporate University, conducts a Learning Committee Meeting. This forum functions as a platform for discussion and for identifying needs as well as proposing human resource competency development from each Technical Deputy."

Based on this process, the objectives of the IBF training were formulated to strengthen national and provincial weather forecasting capacities, promote continuous learning, and build partnerships with regional stakeholders. These objectives of IBF training are considered to align with the vision of BMKG: "The realization of a world-class BMKG with a Socio-Entrepreneur spirit toward a safe and prosperous Indonesia." Indicating that the IBF training holds strong relevance both institutional and national levels.

In terms of substance, the preparation of the IBF training syllabus and materials is carried out through collaboration between BMKG meteorology experts and PPSDM MKG instructors. As a result, the materials produced are not only technically accurate but also compliant with technical training regulations issued by the National Institute of Public Administration (LAN). This is in accordance with LAN Regulation No. 13 of 2011, which states that technical training must enhance knowledge, skills, and professional attitudes in accordance with job competencies.

Participant selection is also designed through a multi-layered mechanism to ensure qualification standards are met. Other aspects of planning include determining the schedule, venue, and budget. The IBF training is conducted at the Multi-purpose Building of the BMKG Training Center in Citeko, Bogor. In terms of budgeting, PPSDM allocates specific funds for the IBF training while also preparing alternative competency development methods through e-learning and virtual technical guidance to address time and budget limitations.

3.2 Implementation of the Impact-Based Forecast Training Program at PPSDM MKG BMKG

The implementation of the IBF training program is carried out using a variety of interactive learning methods. Coaching serves as the main method, complemented by classical lectures, discussions, case studies, simulations, Go-Live Tests, and the use of a Learning Management System (LMS). This aligns with Gagne's principle, which states that learning through diverse methods is more effective for acquiring different types of knowledge (Sahir et al., 2023).

Participants' enthusiasm was evident through their active engagement throughout the learning process, both during theoretical and practical sessions. As noted by one informant, "Active participation was clearly observed during both theoretical discussions and practical activities that required the mastery of new skills, even when the material was challenging, such as weather observation, climate data analysis, and the use of the latest meteorological technologies and instruments." This level of engagement indicates that participants were able to acquire and apply new technical competencies relevant to their professional tasks. This is consistent with Santosa's view that enthusiasm is a strong interest in something, influenced by factors such as intention or goals, awareness of one's strengths and weaknesses, and the motivation to improve (Ami et al., 2021).

Figure 1. Facilitator–Participant Interaction in Impact-Based Forecast Training

In terms of facilities and infrastructure, PPSDM MKG has met the standards set by the National Institute of Public Administration (LAN). The training was conducted at the Multipurpose Building of the BMKG Training Center in Citeko, Bogor, which is equipped with classrooms, computer labs, a library, dormitories, an auditorium, and sports facilities all compliant with technical training standards for government institutions. As stated by Bafadal, the purpose of facilities and infrastructure management is to provide professional services in support of an effective and efficient educational process (Ananda and Banurea, 2017) a condition that supports the effectiveness of training implementation as identified in similar public sector training studies.

Regarding the facilitators, the IBF training program fully involves internal BMKG facilitators, including meteorology experts and PPSDM MKG instructors. This decision aims to maximize internal resource potential while ensuring that the training content remains relevant to BMKG's operational context. This aligns with Suriadi's (2021) perspective on management as a process of utilizing resources effectively and efficiently to achieve predetermined goals.

Overall, the implementation of the IBF training program has been effective, although several challenges remain. One of the main obstacles identified was internet connectivity, particularly due to high demand for access to training support applications. As noted by one informant, "internet-related issues were addressed by coordinating with BMKG's central communication network unit to improve or strengthen connectivity."

3.3 Evaluation of the Impact-Based Forecast Training Program at PPSDM MKG BMKG

The evaluation of the IBF technical training at PPSDM MKG BMKG was carried out systematically and comprehensively using the Kirkpatrick model with a Likert scale for assessing program implementation, while participants were evaluated through formative assessment (comprehensive tests) and summative assessment (Project-Based Learning). The results show that most participants fell into the "Satisfactory" to "Very Satisfactory" categories. These evaluation results indicate that the training objectives were largely achieved. The evaluation of instructors and implementation aspects also indicated that most were rated in the "Excellent" category. The evaluation results were further utilized as the basis for developing subsequent programs and policies. As stated by Mardapi, program evaluation is a method to assess program effectiveness by comparing predetermined criteria or objectives with the outcomes achieved (Fatchurahman, 2019).

In addition, the evaluation findings serve as a key input for the preparation of the Strategic Plan (Renstra) and competency development policies at PPSDM BMKG. This is consistent with Stufflebeam's perspective, which views evaluation as a source of relevant information for informed decision-making, program improvement, and policy formulation (Arifin, 2019). Supporting this view, one informant explained that "the results of the evaluation were used as a basis for program development, activity planning, and the formulation of the Strategic Plan (Renstra) and its revisions, as well as other policies related to competency development within BMKG."

However, the implementation of the IBF training evaluation also encountered some technical challenges, including delays in reporting evaluation results, difficulties in aligning evaluation schedules with training timelines, and a small number of participants failing to complete implementation actions, requiring rescheduling. These challenges highlight the need for improvement, particularly in coordination among stakeholders. This aligns with the concept of formative evaluation, which is conducted during program implementation to provide feedback that enables immediate improvements (Navlia and Arif, 2024).

4. CONCLUSION

The management of the Impact-Based Forecast training program at PPSDM MKG BMKG is carried out systematically, starting from the planning stage, which begins with identifying training needs through the ADDIE model in the Learning Committee Meeting forum. The formulation of objectives, syllabus, and materials is conducted collaboratively in accordance with LAN standards, with participant selection based on technical qualifications and organizational needs.

In the implementation stage, the training combines coaching methods with other learning strategies such as case studies, classical lectures, Go-Live Tests, and the use of an LMS, enabling participants not only to understand the concepts but also to apply them through implementation actions in their respective work units. The provided facilities are adequate, although several technical challenges, such as internet connectivity and limited training time, still need improvement.

The training evaluation uses the Kirkpatrick model, covering assessments of participants, instructors, organizers, and facilities. The results show ratings ranging from "Very Good" to "Highly Satisfactory," serving as a basis for future improvements and development of the training program. However, there are notes for improvement, such as delays in reporting and the suboptimal implementation actions by some participants.

Based on these findings, several actionable recommendations can be proposed. PPSDM MKG BMKG is encouraged to strengthen coordination among training organizers, facilitators, and participants to ensure the timely completion of evaluation reports. In addition, improving internet infrastructure and allocating sufficient training time are necessary to support digital-based learning activities. The establishment of a structured post-training monitoring mechanism is also recommended to ensure that implementation actions are consistently carried out and documented in participants' work units.

This study has several limitations. Although the qualitative descriptive method was implemented in accordance with scientific procedures, limitations were encountered in terms of data availability and field conditions. Some data could not be fully obtained, which constrained the depth of analysis and required careful interpretation of the findings. In addition, government budget efficiency policies affected working arrangements at PPSDM MKG BMKG, resulting in reduced on-site working days. This condition limited the intensity of field visits and required adjustments to the data collection schedule.

Despite these limitations, the findings demonstrate important practical implications. The IBF training program contributes to strengthening BMKG's human resource capacity in implementing impact-based weather forecasting, particularly through mandatory post-training implementation actions. This approach ensures that the competencies acquired are not limited to theoretical understanding but are directly applied within participants' respective work units, thereby reinforcing BMKG's role in hydrometeorological disaster mitigation. Furthermore, the structured management of the IBF training program offers a practical reference for other government training institutions seeking to strengthen sustainable human resource development and enhance institutional readiness in the public sector. Future research is recommended to further examine the management of technical training programs by focusing on the effectiveness of post-training implementation in participants' work units or by analyzing the long-term impact of IBF training on the quality of BMKG services, especially in the context of hydrometeorological disaster mitigation.

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