Implementing a Blended Training Couse on the Introduction of Geology for Spatial Planning: Potentials and Lessons Learnt

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Key words: Education; Blended Learning; Geological Risk; Spatial Planning; Technical Cooperation

SUMMARY

The Ministry of Energy and Mineral Resources of Indonesia, through its Human Resources Development Agency for Energy and Mineral Resources (BPSDM ESDM) has a mandate to conduct trainings for public servants and the community in various topics of geology and mineral resources. This includes training in geological hazards, hazard mitigation and spatial planning.

Since 2015 the German Development Cooperation supports BPSDM ESDM to enhance its capacities for training delivery towards geological risk mitigation (Georisk-Project, implemented by the Federal Institute for Geosciences and Natural Resources), taking into account the institutional set-up in Indonesia to provide a harmonized knowledge transfer among the public servants of the country. One of the activities is the development of the new training "Introduction to Geology for Spatial Planning", which aims to prepare local governments for the implementation of disaster mitigation via spatial planningThis has already been demanded by Law No. 26/2007 on Spatial Planning. The new training applies the most recent scientific findings and new didactical approaches, by utilizing a spatial planning guideline, developed by the Geological Agency of Indonesia in 2015, aiming for a more effective learning experience during the training courses.

The previous training courses offered at BPSDM ESDM on that topic were lacking explanations of regular spatial planning issues, did not follow training delivery standards to ensure knowledge transfer and did not sufficiently use practical learning approaches. The new training uses three fundamentals in one bundle: a curriculum that specifies the contents and learning objectives generally; three modules with the whole content of the training that can also be used as scripts for the participants; standardized oresentation slides, which should be used by the trainers during the sessions;and a didactic guidance that gives recommendations and minimum requirements for training delivery to trainers. These documents, together with a supporting Training Management SOP that was developed by BPSDM ESDM for quality control of trainings, enables the institution to effectivelyimplement andmanagetrainings. As a side effectexternal trainers are supportedin their preparation and provided with these minimum standards if in-house staff is unavailable.

The new training also functionsas a pilot for the implementation of an online Learning Management System (LMS). The LMS has been installed to tackle the difficult training situation at the training authority, namely the lack of effectiveness due to huge variations in prior knowledge levels of

participants and accessibility constraints especially for participants from remote areas. Using Blended Learning, time of physical absence from their offices and training costsare reduced. In addition, knowledge levels are harmonized before the cost intense classroom training starts. This is achieved by implementing the introductory topics of the training asfirst online Modules. The implementation of an eLearning system can be considered an important step for Indonesian human resource development institutions towards enhanced accessibility to education, especially for the remote provinces of the country.

The new training course does not tackle all the challenges that local governments face in the implementation of georisk-sensitive spatial planning, but it addresses the harmonization of knowledge among Indonesian government officials. The new training setupalso provides an outlook ont he benefits ofutilitizing new technologies.

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1. INTRODUCTION

The Human Resource Development Agency of the Ministry of Energy and Mineral Resources of Indonesia (BPSDM ESDM), has the mandate to conduct trainings for public servants related to geology and mineral resources, which includes training in geological hazards and spatial planning. The German Development Cooperation supports BPSDM ESDM since 2015 to increase its capabilities for training delivery in the field of geological risk mitigation (Georisk-Project, implemented by the Federal Institute for Geosciences and Natural Resources). The project takes into account the institutional set-up of subordinated training centers in Indonesia to harmonize knowledge transfer from science to public servants of the country.

Taking into consideration that Indonesia is prone to various natural hazards such as hydro-meteorological (floods, droughts),geological (volcanoes, earthquakes and tsunamis) (Nurhayati et al. 2015), it is then important to improve governmental capacities to deal with the potential disasters but also mitigate risks. One effective way to reduce the impact of natural hazards is spatial planning (Sutanta et al. 2013). In Indonesia the existing knowledge on the local level about spatial planning and its application in the geological hazard mitigation context is still limited. Therefore, education and training in geology and spatial planning become an important taskt.

In addition to being an important step for disaster risk reduction, education and training are essential in capacity building and are integral to good human resource management (Akkermans et al. 2015). Good coordination among all relevant parties is necessary to carry out effective educational courses or training workshops in order to create skilled and competent human resources that meet the needs of their respective institutions. Education and training at this level aim to improve the performance of the whole government apparatus in delivering services to the public, also enhancing livelihood of disenfranchised people. It is a remaining challenge to incorporate key issues such as societal, economic and political issues into planning (Klein et al. 2012). The Ministerial Decree No. 13 of 2016 states that the main objective of the PusatPengembanganSumberDayaManusiaGeologi, Mineral dan Batubara is to organize education and training on geology in order for human resources that work within the field of geology can acquire relevant knowledge and skills so that they will be more productive and able to overcome complex problems.
Competent and strategy-minded staff will give value to the institution itself by promoting and spreading knowledge. The Ministerial Decree No. 18 of 2010 states that the main objective of the Training Centre forGeologi(now Human resource Development Centre for Geologi, Mineral and Coal) is to develop and implement education and training on geology for governmental employees that work within the field of geology. Support them inacquiring relevant knowledge and skills and serve as mediators between the scientific knowledge providers and governmental units.

Along with the fact that spatial planning errors can lead to aggravate disaster risk, there is a need for education and training on the basics of geology-based spatial planning in Indonesia. Planners, public servants, and related stakeholders need to be risk aware reduce negative environmental impacts caused by irresponsible planning.

The course on geology-based spatial planning consists of a basic introduction to concepts of spatial planning as well as basic geology vital to spatial planning. This basic knowledge needs to be taught considering that a majority of the course participants (local government planners and related public servants) often do not have a background in geology but range from varying contexts (from social sciences to engineering). The new standard curriculum of the training o focuses on analyzing and interpreting geologic factors for spatial planning.

The course uses anonline Learning Management System (LMS), a pilot implementation at the training center, to tackle the difficult training implementation situation of the authority. With Blended Learning, absent times of participants from their local government offices and training costsare reduced; knowledge levels are harmonized prior to the cost-intensive classroom training.By definition, E-Learning is "used to describe the fields of online learning, web-based training and technology-delivered instruction. ELearning could be interpreted as electronic learning; the learning that involves the Internet; learning from a distance via the aid of the Internet and, or other electronic gadgets" (Nneka Eke, 2010). Azeiteiro et al (2010) argued that E-learning is a teaching and learning process. It is based on an appropriate distance learning pedagogical model that allows flexible learner-centred education using the information and communication technologies (ICT). In this project, e-learning is system where teaching materials are put in the internet where participants can study it off the class and interactions among participants and trainers are conducted within the internet.

2. METHODOLOGY

The new curriculum for the geology-based spatial planning training course utilized the LMS software Moodle to enable the blended learning environment. This enables (1) online classes alongside face-to-face classroom interaction; (2) enhanced communication between trainers and participants even after the lessons; and (3) data storage of constantly improved training materials using the same standard.

Three main features are included in the LMS package: online teaching and learning material, discussion and forum-communication, and assignments and exams. The online teaching material allowesparticipants to access lesson categories, text- or multimedia-based materials, and additional reading materials. Mailing lists, instant messaging, and real-time communication via the online forum enables in-depth discussion between instructor and participants. Finally, having exams and assignments on Moodle makes it easier for participants to take part in the course more actively while at the same time reduces costs of transportation and logistics. This enables a true distant learning experience, especially for participants based outside the city centres.

Other than moving the introduction part of the training course to the online LMS, the course was updated based on state-of-the-art scientific knowledge. Therefore a strengths, weaknesses, opportunities and threats (SWOT) analysiswas done on the previous curriculum. This aimed to look at the difference between actual and potential performance both internally and externally of the previous course and its participants. Furthermore, focus group discussion were conducted to decide on all the changes in the curriculum. This was mainly done in order to acquire feedback that contextualizes the training needs to the specific local needs.

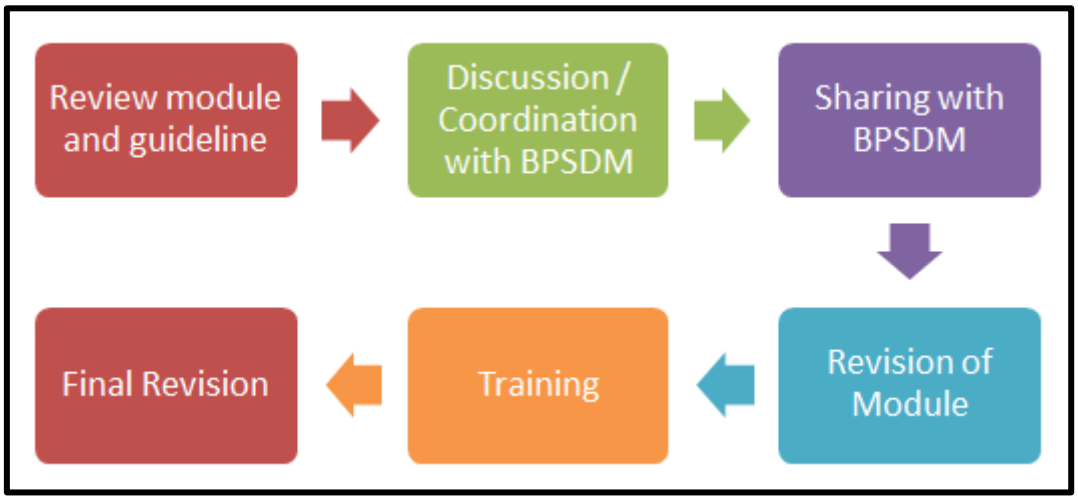

Figure 1. Activity Steps for Module Review and Revision

The gap analysis was conducted twice; the first was to compare the current curriculum/module with relevant literature and national guidelines on geology and spatial planning, while the second compared it with existing previous modules. For the first analysis the curriculum was reviewed against relevant literature, legislations (law, spatial plans, etc.), and case studies in other areas (nationally and internationally). Secondly, the moduleswere reviewed against the previous modules (flow of modules, depth of the material, content, excluded content, and redundant content).

The previous modules that were reviewed included the Guideline for Application of Geological Hazard Information in Spatial Planning and Public Works (Ministerial Decree no. 20 of 2007)and Analysis Techniques for the Physical and Environmental, Economic, and Socio-cultural Aspects. Other input came from modules including the previous Curriculum for the Geology-based Spatial Planning Course and the Curriculum for GIS in Geology-based Spatial Planning. Focus group discussions and workshops were also conducted between the training institution and the Geology Agency of Indonesia (BadanGeologi) as the scientific body for geological questions, facilitated by the Georisk Project. These elements were analyzed in order to acquire information on the drawbacks of the previous curriculum, so that new strategies wereincluded in the new curriculum.

3. RESULTS

The analyses of the previous trainings show that theywere lacking in depth explanations of the interconnectedness of spatial planning issues. The training outline was looking from the geological point of view and some technical analysis for carrying out suitability mapping, such as scoring and overlaying maps.As spatial planning deals with building future scenarios of land use and development, we found that the old training needed an update on that topic. Some common tools, such as conflict analysis and participation in spatial planning process were also absent. Again, this is due to the previous training heavily emphasizing on geological and technical issues.

As the new training and modules refer to the guideline of spatial planning, three main tools are added: conflict analysis, participation techniques and building future scenarios. These tools have been also tested by to some BPSDM trainers. The responses shows that these tools are quite new to them,theyconsider them useful for future trainings.

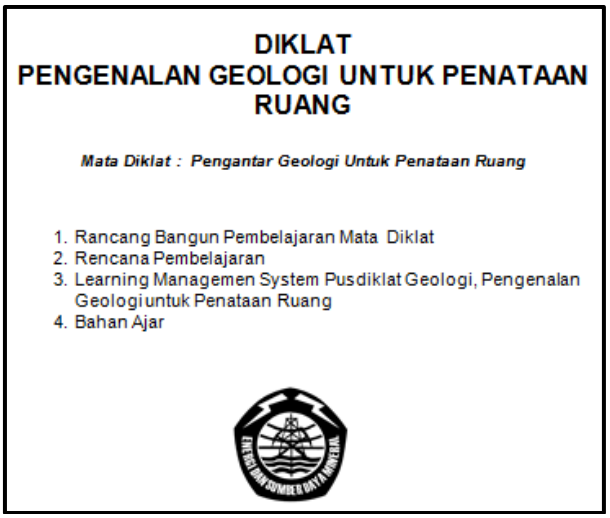

Figure 2 Didactic Material

The old training did not follow specific delivery standards to ensure knowledge transfer as well as did not apply necessary practical learning approaches. As this training is aimed for professionals and government officers who have basic knowledge on the subject of spatial planning, the participants need more practical learning, rather than theoretical. They need to work on case studies, apply the case studies and develop alternatives to solve the case studies. To accommodate this, the new training develop a bundle of training materials: (i) a curriculum that specifies the contents and learning objectives generally; (ii) three consecutive modules that can also be used as scripts for the participants; (iii) standard slides, which should be used during the trainings and (iv) a didactic guidance for trainers that gives recommendations and minimum requirements for training delivery. As there are only a limited number of trainers available, BPSDM regularly asks external trainers to deliver the training. The new document bundle, together with a supporting Training Management Standard Operational Procedure (SOP) enables the institution to evaluate the trainings and external

trainers to prepare trainings in a target oriented manner according to pre-set standards. The external trainers are still able to develop their own detailedexamplesand ideas but are somehow bound to follow the predefined training scheme. The pre-set standard will help to make sure that the training applies the same depth of quality.

Figure 3. Provision of Training Material

In the new training, the LMS Module (1), consists of four sub-competences, namely: (1)Basic concept of spatial planning, (2) basic concept of geology, (3) spatial planning regulation in Indonesia and (4) spatial planning problems (conflict analysis).

Figure 4The Front Page of LMS of Geology Introduction for Spatial Planning

The new training uses a blended learning system, with eLearning in the first element (introductory phase) of the training including a highly interactive approach with practical elements to encourage the participants to directly apply basic theoretical knowledge. The second element is on data and information systems, while the third element is on interpreting maps for geological, thematic and spatial planning analyses.

However, there are two other modules in the training: Module 2 is on data provision for geological based - spatial planning and Module 3 is on using the geology thematic map for geological based – spatial planning. Module 2 consists of (i) data and information in geology and arrangement in spatial planning (ii) data inventory and information of land use (iii) data inventory and information of geology (iv) basic concepts of GIS in living environment, (v) data and information in GIS. Module 3 consists of (i) using geological thematic maps for spatial planning (ii) thematic analysis for spatial planning.

Two elements are particularly important:The importance of data in spatial planning, especially data related to the geological information. Thus the critical collection of data and information for geology-based spatial planning is important. For the sake of the training only basic methods will be applied since the main goal is to make the participants understand the importance of data and how to strategically use them for geology-based spatial planning. Any specific utilization of data using software will be addressed in other training courses.

The second important element is to enable participants to read and use thematic maps in order to formulate geology-based spatial plans. Considering the amount of skills and knowledge needed to create thematic maps, creating them is not part of the new curriculum rather how to properly read and interpret them in order to have provide the basis for informed decisions. Equipped with, for example, contour maps, land suitability maps, vegetation maps, and rock formation maps, participants should be able to have data-backed judgements on possible conflicting and or hazardous areas. This will help them decide strategically in planning situations and not just at the technical level.

In the first part of the training, participants have to register and log in to the website of LMS (Learning Management System) to take part in the first part of the training. The participants must complete this first part in order to be able to enroll in the complete training course. This section is enriched with videos and animations that assist participants to learn the materials quickly. The forum enables the trainers to interact with the participants regularly and monitor progress on assignements. Participants can post questions and also provide responds to the questions or case studies provided by the trainers and other participants.

CONCLUSION

The new training course does not tackle all the challenges that local governments face related toin the implementation of georisk-sensitive spatial planning, but it approaches addresses the harmonization of knowledge among Indonesian government officials. The new training setup for the mitigation of geological risks and givesalso provides an outlook for theont he benefits of utilityizing of new technologies.
Although thenew curriculum format is in line with the standard curriculum in BPSDM, the new curriculum has brought several benefits compared to the old ones. One of the main contributions of this new curriculum is that it (1) levels existing knowledge on spatial planning prior to the

classroom exercise, (2) it provides examples for external trainers who are involved in the training provision by maintaining minimum standards.

The new bundle of materials has provided a set of standard useful for the future training delivery. These documents, together with a supporting Training Management SOP also enable the institution to evaluate the trainings and external trainers to prepare trainings in a target oriented manner according to pre-set standards.

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BIOGRAPHICAL NOTES

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