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Preventing Practices of Manipulating Accident Data in the Coal Mining Sector Using Mobile Applications in East Kalimantan, Indonesia

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Abstract:

Objective: The practice of manipulating data on work accidents and potential hazards still occurs, especially in the coal mining sector. A mobile application for reporting work accidents and potential hazards is required so that data manipulation practices can be prevented.

Material and Methods: The research design used was exploratory, which aimed to introduce and explore the capabilities of the SIKAP mobile application (Information System for Occupational Accidents, Occupational Diseases and Potential Hazards) to prevent data manipulation practices. Researchers involved thirty coal mine workers, using the SIKAP application, which had been tested on three information systems experts using the black box testing method.

Results: Every worker had the opportunity to report work accidents and potential dangers via the SIKAP application on the worker's account. Companies can receive and follow up on worker reports via the company account. Regional governments in the field of labor development and inspection can monitor reports through government accounts. The SIKAP application is integrated and synchronized between workers, companies and the government.

Conclusion: The SIKAP application is able to prevent the practice of manipulating work accident reporting data and potential hazards in the coal mining sector.

Keywords: accident prevention, coal mining, manipulation of data, mobile application

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Introduction

Coal companies in Indonesia are still one of the most lucrative business sectors and have even become one of the favorite business sectors in East Kalimantan to this day[1]. However, the coal mining sector is also one of the sectors that contributes to the high number of work accidents and work-related diseases. It is known that all stages of mining activities contain dangers that have a high risk of causing workers to suffer both minor and serious injuries and even death.

The Indonesian government continues to make improvements so that the mining sector is no longer a scary place to work, especially for mining workers. One of them is by issuing regulations, such as the Regulation of the Minister of Energy and Mineral Resources of the Republic of Indonesia Number 26 of 2018, concerning the Implementation of Good Mining Principles and Supervision of Mineral and Coal Mining. Additionally, this is followed by the Decree of the Directorate General of Minerals and Coal Number 185.K/37.04/DJB/2019, concerning Technical Guidelines for the Implementation of Mining Safety and Implementation of the Assessment and Reporting of Mineral and Coal Mining Safety Management Systems.

Apart from the government's role, companies also have the responsibility to implement occupational safety and health (OSH) efforts to ensure that workers continue to receive protection and safety while working. This has been regulated in Law Number 13 of 2003, concerning Employment[2], and the Government Regulation Number 50 of 2012, concerning the Implementation of an Occupational Safety and Health Management System, which is integrated within company management systems[3].

One of the efforts to prevent work accidents and work-related diseases is through reporting work accidents, work-related diseases and potential dangers, as well as both routine reports and special reports when work accidents occur. This report contains a number of different information related to work accidents[4]. Additionally, this information will help company management to carry out immediate control over potential dangers so as not to result in work accidents in the future[5]. However, in practice, there are still problems with reporting that is not transparent and tends to be manipulative.

Space for the practice of manipulating data on work accidents and work-related illnesses reported from companies to the government as the agency supervising coal mining operations remains wide open. One of the reasons is that the reporting system used is still conventional, utilizing written work accident and occupational disease reporting forms.6 The practice of manipulating report data can not only be carried out by worker, but also by company OSH officers and/or government employees.

A real-time, integrated and synchronized information system for reporting work accidents, work-related illnesses and potential hazards is needed to prevent the practice of data manipulation when reporting is carried out. This is also in accordance with previous research recommendations that stated that one of the efforts to control the practice of manipulating work accident and occupational disease data is to utilize a digitalization-based reporting information system[7]. The work accident reporting system using the I-Safe application helps in implementing OSH in coal mining.25 Based on existing problems, research is needed to introduce and explore the capabilities of the SIKAP application to prevent data manipulation practices in coal mining in East Kalimantan, Indonesia.

Material and Methods

This research used an exploratory design by utilizing the SIKAP application in the reporting system for work accidents, work-related diseases and potential hazards in coal mining. This research involved thirty coal mining workers from several coal companies operating in Samarinda City, East Kalimantan Province, Indonesia. Every worker was given the opportunity to use the SIKAP application to report work accidents, work-related illnesses,

and potential dangers that have been experienced or seen while working at a coal company. The research was carried out in October 2023, based on a permit to carry out research issued by the Faculty of Economics and Business, Mulawarman University Number: 202/UN17.1.36.1/DT/2023. The results of trials using the SIKAP application on coal mining workers were then analyzed to assess the ability of the SIKAP application to prevent the practice of manipulating work accident reporting data, work-related diseases and potential hazards in coal mining.

Results

The SIKAP application is an acronym for: Information System for Reporting Work Accidents, Occupational Diseases and Potential Hazards. The SIKAP reporting application was tested on three information systems experts before being used by workers involved in this research, using the black box testing method. The involvement of these three experts was to test the functionality of all the features in the SIKAP application. The initial display when opening the SIKAP application consists of information about SIKAP, information about OSH activities, OSH policies, and other information related to OSH. There is an access menu at the bottom of the information consisting of worker, company and government accounts.

The worker account is preceded by creating a username, name, work unit, position, cellphone number; uploading a photo, and account password. Next, the worker clicks Log in by entering the username and password for the account that has been created. After logging in, several application menus will appear consisting of Home, Announcements, Notifications, and Profile. The Home menu consists of Today's Data, Work Accident Report, Occupational Disease Report, Potential Hazard Report, and Report History.

Today's data includes data on work accidents, occupational disease, and potential dangers that have been reported by the worker and other workers at the company where they works. If the worker wants to report a work accident, they click the Report Work Accident menu. In this menu, workers enter a number of information, namely the type of work accident, victims, date of the incident, time of the incident, location of the incident, body parts injured as a result of the accident, and actions taken by workers when experiencing an accident by attaching documentation/photos of the time of the incident. After completing all the required information, the worker then clicks Report.

Workers who want to report work-related illnesses can click Report of occupational disease. In the occupational disease report menu, a number of different information will be entered by the worker; namely the type of occupational disease, details of the occupational disease, the complaint felt, the date and time of the complaint, and the actions taken by the worker when experiencing the complaint: accompanied by documentation/photos. After completing all the required information, the worker then clicks Report. If the worker wants to report a potential hazard, they click Report Potential Hazard and fill in some information, namely location, description of the type of hazard, risks, actions taken, and attach documentation/photos of witnessing the potential hazard. After completing all the required information, the worker then clicks Report.

Worker accounts also have a Report History menu. This menu functions to check/monitor the status or reporting history of work accidents, occupational disease, and potential hazards that have been carried out by workers to the company's OSH unit. Workers can see the progress of the reports that have been carried out. The history of Work Accident Reports, occupational disease, and Potential Hazards consists of the statuses: Sent, Processed, and Completed/Rejected. In this section, workers can see a description of the accident, occupational disease and potential hazard report information that has been filled in when reporting.

The report that has been sent by the worker can then be seen as to if the report was processed/received

by officers in the OSH unit, accompanied by the identity of the report recipient. Information is also obtained regarding suggestions/directions from officers in the OSH unit to workers/reporters. Workers will also receive information that the report has been completed by the OSH officer, accompanied by a description of the final action report from the OSH officer. In this section, there is also information about the rejection of reports made by OSH officers if the report is deemed to have been repeatedly reported or has been completed by OSH officers.

In the Available Announcements menu workers will see schedules or other important agendas that are provided by the company's OSH officers. On the Notification menu, workers will receive notifications automatically from reports that have been made previously. The profile will display a number of workers' personal information; including name, work unit and position. Details of the worker's SIKAP account can be seen in Figure 1.

Creating and using a company account is almost the same as creating a worker account, namely creating a username, name, work unit, position, cellphone number, uploading photos and account password. After registering the account, the company OSH officer then clicks Log in, by entering the username and password for the account that has been created. When you log in, several application menus will appear consisting of: Home, Announcements, Notifications and Profile.

Figure 1 Display of worker accounts in the SIKAP application

The Home menu consists of Today's Data, Incoming Reports, Process Reports, and Completed Reports. Today's Data Menu, which includes data on work accidents, occupational disease, and potential hazards that have been reported by workers at the company. In this section, company OSH officers can search for accidents, occupational diseases and potential hazard data: both daily data and data according to the desired time period, by clicking Search Data. The desired data can be displayed in graphical form by clicking the Graph button.

In the Incoming Reports, Process Reports and Completed Reports menu, company OSH officers can see a number of incoming report data from workers. OSH officers can also accept or reject reports from workers, by providing directions/information addressed to the worker. In the Announcements menu, OSH officers can delete or add other important events/agenda, which will be relayed to workers. In the Notification menu, the company's OSH officer will receive notifications automatically for each stage of incoming reporting and the profile will display a number of the company OSH officer's information. Details of the company's SIKAP account can be seen in Figure 2.

Creating a government account, represented by certain service employees that are given the task concerning accidents, occupational diseases, and potential danger data, by creating a username, name, work unit, position, cellphone number; uploading photos and account password. After registering an account, employees in certain departments then click Log in, by entering the username and password for the account that has been created. After logging in, several application menus will appear consisting of: Home, Notifications and Profile.

The Home menu consists of Today's Data and Reports. Today's data includes data on work accidents,

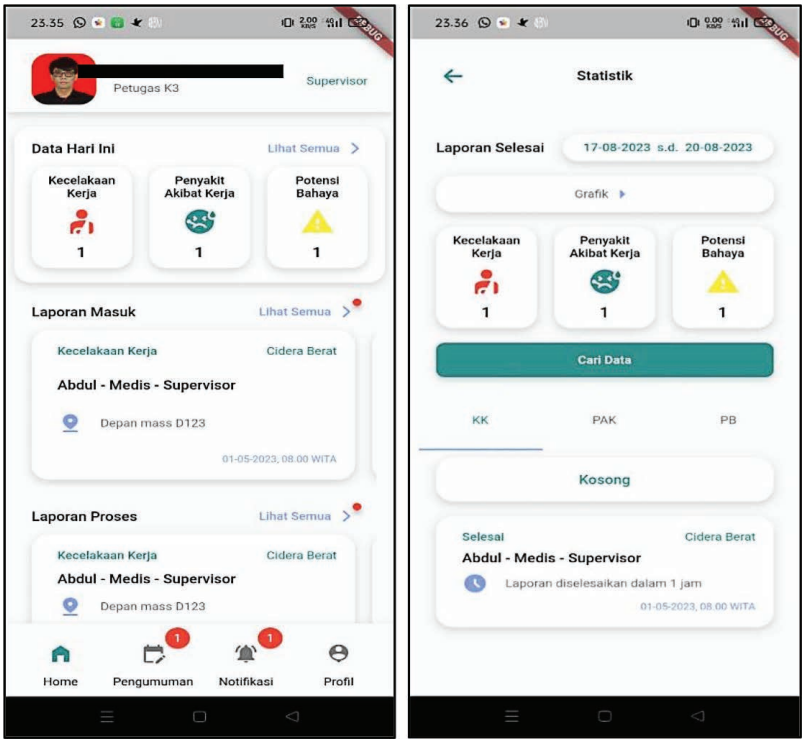

Figure 2 Display of company accounts in the SIKAP application

occupational diseases, and potential dangers that have been reported by workers at certain companies. In this section, certain service employees can search for accidents, occupational diseases and potential hazard data; both daily data and data according to the specific time period desired by clicking Search Data. The desired data can be displayed in graphical form by clicking the Graph button. In the Reports menu, accident, occupational diseases and potential hazard reports will be displayed in the Incoming, Processing and Completed Reports menu.

Certain service employees can view a number of incoming report data from workers at certain companies, along with the history of each report. Service employees can also provide suggestions/input aimed at the company regarding incidents reported by their workers. In the Notification menu, certain service employees will receive automatic notifications of each reporting process/stage that is entered into the SIKAP account belonging to a certain service. The profile will display a number of different information about certain service employees that handle work accident data, occupational diseases and potential hazards. Details of the government's SIKAP account can be seen in Figure 3.

Based on this explanation, a brief flow diagram of how the SIKAP application works is as follows.

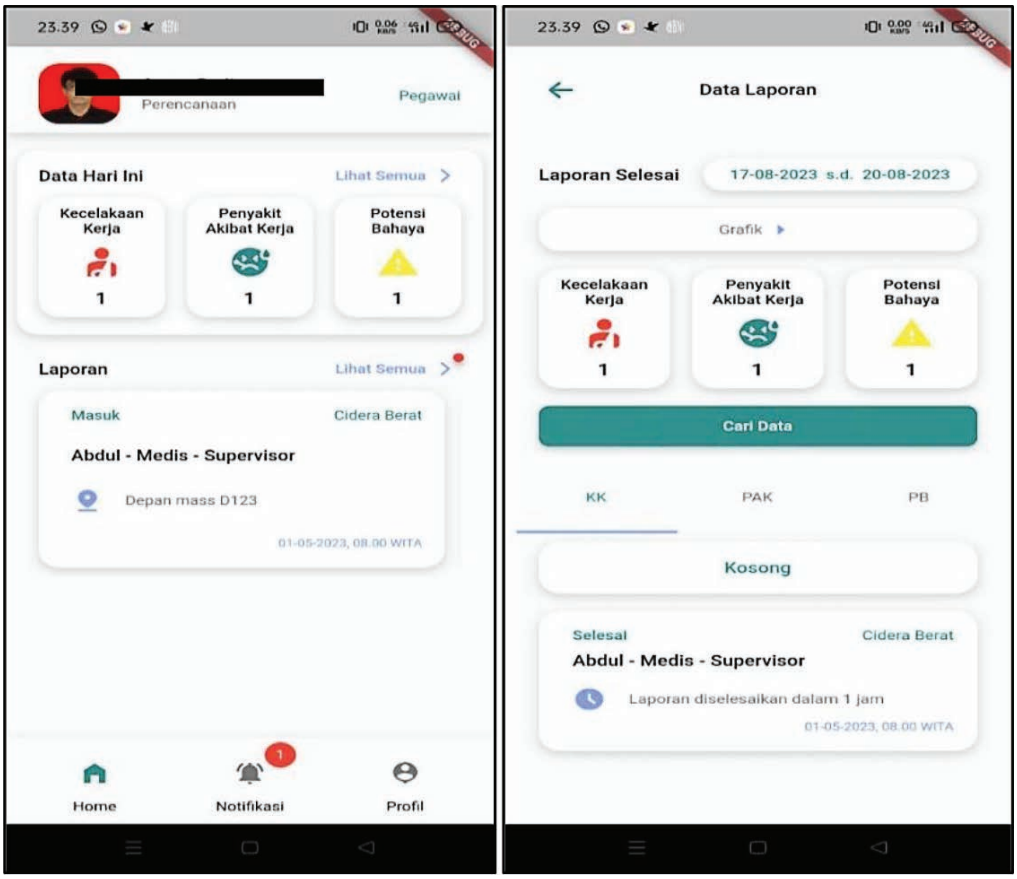

Figure 3 Display of government accounts in the SIKAP application

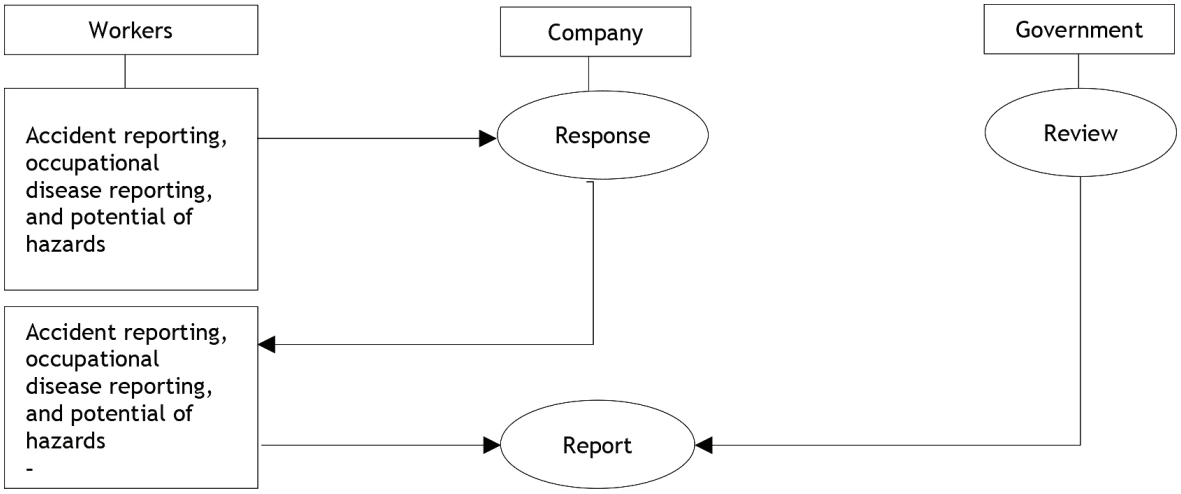

Figure 4 A flow diagram that explains how the application works

Discussion

The Indonesian government continues to make improvements to improve the coal mining sector, as one of the sectors at risk of work accidents and work-related diseases through regulations. In several countries; such as China and Australia, regulations regarding coal mine safety have been developed[8]. Regulations that are consistent in their implementation can influence workers' behavior at work[9].

Reporting of work accidents, work-related diseases and potential hazards in the workplace, including in the coal mining sector, has been regulated via the Minister of Manpower Regulation Number 3 of 1998, concerning Procedures for Reporting and Inspecting Accidents. This has been used since 1998, until now using a written report format and an online reporting system and conventional forms the company to the local regional government and the Ministry of Manpower of the Republic of Indonesia. Such reporting management has a number of weaknesses, such as the reporting process being slow, the possibility of incomplete information being obtained, due to the disappearance of witnesses and loss of evidence when a work accident occurs, the unavailability of forms at the scene of the incident as well as other, various weaknesses.

Incomplete information regarding work accidents, work-related diseases and potential workplace hazards has a negative impact on the company's OSH performance. It is difficult for company management to take action to prevent and handle work accidents and work-related diseases if they are not supported by detailed data and information regarding the root causes or potential hazards, which result from work accidents and work-related diseases. On the other hand, having complete information about potential hazards in the work environment makes it easier for companies to identify work areas that are at risk of work accidents and proceed with corrective action so that similar incidents do not happen again[10].

Reporting work accidents, work-related diseases and potential hazards is not only the company's responsibility to the government, especially when work accidents and work-related diseases occur, but also requires worker participation in reporting[11]. This has also been regulated based on the Decree of the Directorate General of Minerals and Coal Number 185.K/37.04/DJB/2019, in that every

mining worker is obliged to report any accidents or injuries caused by work or related to work. However, it has been found that mining workers think that reporting work accidents and potential dangers in the workplace is not important, so it is necessary to increase workers' perceptions of the importance of reporting[12].

Work accident reporting aims to make it easier for company management to identify work areas that allow work accidents[10], and at the same time identify the causes of accidents, so that work accidents can be prevented early on[13]. In addition, Work accident reports can also estimate workers' unsafe actions[14]. However, the OSH efforts carried out are still less effective in preventing work accidents, so a better investigation system is needed[15]. Reporting coal mining accidents can also improve safety management in the sector of mining[16].

Reporting accidents and potential dangers by workers need to receive support from the company[11]. Workers' participation in reporting work accidents is not enough to create an OSH culture in the workplace, as the role of the company is also needed[17]. Companies that have a high commitment to safety are positively correlated with workers' OSH behavior[18]. Solutions to preventing work accidents and occupational diseases require partnerships and synergy between workers, government, companies and other parties[19].

Challenges faced in reporting work accidents, work-related diseases and potential hazards in coal mining has a large number of cases that occur, but are hidden or not reported[20]. The practice of hiding, deleting data, or changing some or all of the data is an act of manipulation that will harm various parties, especially workers. Likewise, companies will experience difficulty in following up on OSH improvement efforts. Therefore, a digitalization-based information system is needed in the form of an application for reporting work accidents, work-related illnesses and potential hazards in coal mining. The information produced from the reporting system becomes the basis for companies to make appropriate decisions[21], and has a positive impact on worker performance[22]. The use of mining information technology has a positive impact on increasing safety and productivity[23]. The work accident reporting system using the I-Safe application helps in implementing OSH in coal mining[24].

The question is: is the SIKAP application able to prevent the practice of manipulating data on accidents, occupational disease and potential hazards in coal mining? The SIKAP application consists of three user groups, namely workers, companies and government. This is intended so that the reporting carried out does not only involve workers and companies for internal purposes, but also involves the government so that reports of work accidents, work-related illnesses and potential hazards in coal mining can be jointly accounted for by all parties: as related to accident data, work and potential hazards.

Every worker has the opportunity to report any work accidents, work-related illnesses and potential dangers experienced by themselves or their co-workers through the worker's account in the SIKAP application. Mining workers are able to find out in real-time the number of reports of work accidents, work-related illnesses and potential hazards that are entered into the application, whether reported by themselves or reported from other workers. Apart from that, workers have the opportunity to monitor the progress of each report made, so that it is not just reporting, but there is attention and follow-up from the company.

Worker Mr. Andi reported a minor work accident, namely an injury to his hand due to being caught while installing a car tire in the workshop area. Mr. Andi reported the incident he experienced via the SIKAP application in the work accident reporting menu. OSH officers received notification that a report had been made by Mr. Andy. Officers at government agencies also received notification of the reporting made by Mr. Andi. Officers in the OSH

unit processed Mr. Andi's report and advised him to stop work, then visited the scene to pick him up and take Mr. Andi to the company clinic. All processes carried out by company OSH officers can be seen by officers in government agencies and provide advice to the company OSH officers to immediately handle work accident victims.

Reports of work accidents, work-related illnesses and potential hazards carried out by workers will be connected and synchronized with the SIKAP account owned by the company and government. Companies can follow up on reports of potential dangers reported by workers with various efforts or programs to prevent these potential dangers from causing work accidents and work-related diseases. Likewise, reports of work accidents and work-related illnesses reported in the SIKAP application are then followed up by the company in the form of immediate treatment so as not to cause more serious injuries.

The reporting data received by the government is also in real-time so that the government is advised on the total data on work accidents, work-related diseases and potential hazards that have been carried out by workers. Apart from that, the government can also find out about the handling actions that have been taken by the company regarding work accidents and work-related illnesses experienced by workers. This means that there is no difference in the amount of data reported by workers and the data that will be received in company and government accounts. The compatibility of data received between workers, companies and the government will close the space for anyone to carry out data manipulation practices in the future, especially when companies make periodic reports and special reports to the government.

Conclusion

The SIKAP application is an innovative step in the reporting system for work accidents, work-related illnesses and potential hazards to prevent the practice of manipulating report data in coal mining within Indonesia. The data and information available in the SIKAP application is not yet synchronized by other data users, such as health insurance for workers, so the SIKAP application can be further developed in the future.

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Conflict of interest

No conflicts of interest.

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