

Effectiveness of Web-Based Near Miss Reporting Program on Preventing Occupational Accident

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Abstract—Hundreds of thousand occupational accident still happened in Indonesia during 2018 and 195 cases happened in two biggest shoe factories at Karawang, this study will analyze the effectiveness of web-based near miss reporting program on preventing accident. The design of this study is case control, factory with web-based near miss reporting program will be case and control from factory that use paper-based near miss reporting system. The result showed factory implementing near miss reporting program with web-based have 78.04% smaller recordable accident rate and 4.15% higher on decreasing recordable accident rate in three years, compared to paper-based reporting system. Nowadays technology and internet make people easier to do the daily activity, including near miss reporting. Near miss report is one of the method for early detection of the hazards that can cause an accident.

Keywords: *web-based, near miss, report, accident, prevention*

I. INTRODUCTION

More than one hundred thousand occupational accidents occur in Indonesia during 2018, this number means that every hour of work occurs 12 cases of accidents. 195 cases of accidents occurred in the two largest footwear factory in Karawang Regency. According to James Reason, human factors, perceptions of risk and behavior of workers have an important role in the occurrence of occupational accidents [1]. According to Heinrich, the accident pyramid he created can be interpreted that every major accident has many minor accidents and more accidents that damage property or accidents that do not cause injury [2]. The accident pyramid is one of the bases used by the two companies to reduce the number of work accidents, namely by detecting and reporting near miss events. Identifying and investigating near miss is a key element to find and controlling the risks before it harm workers and property damage [3]. Near-miss reporting and analysis provides an additional metric for assessing worker safety performance [4]. Each company uses a different method to do near miss reporting, PT A uses a web-based reporting system and PT B uses a hazard card (manual) system. Both systems were implemented simultaneously in 2016 at both companies to reduce the number of accidents. Occupational accident data shows a decrease in accident rates, but which system is more effective at reducing accidents? This research was conducted to see the effectiveness of the near miss

reporting system, so it can be used as a consideration for other institutions to develop accident reduction programs.

II. METHOD

The method used in this study is case control with purposive sampling, PT A becomes the case and PT B becomes control. The inclusion criteria are implement near miss program, same accident data analysis, and same factory code of conduct. Observations were carried out for three years start from 2016 to 2018. Standard 29 CFR No. 1904 issued by OSHA [5] used for record the data and classify the accidents. Accident data is analyzed using the OSHA Incident Rate formula [6], the formula on (1).

$$\frac{\text{Number of incident} \times 200000}{\text{Number of working hour in one year}} = \text{Incident Rate}$$

Equation 1. OSHA Incident Rate Formula

The number 200,000 in the formula represents the number of hours 100 employees who work 40 hours per week, 50 weeks per year, this formula is used to calculate the incident rate for 1 year. Both companies carry out the same program with different methods. PT A uses a web-based reporting system, by facilitating each work section with a set of computer devices that easily accessed by workers. This computer is equipped with an application for the near miss reporting platform, near miss that is inputted into the application will be immediately received by the HSE team via email and notification on the application. PT B uses a paper-based system, which uses a card provided in each work section complete with boxes for cards that have been filled and will be taken by the HSE team every week.

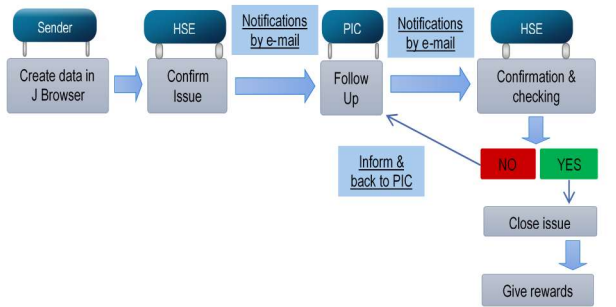


Fig. 1. The flow process of the near miss reporting uses web-based system at PT A

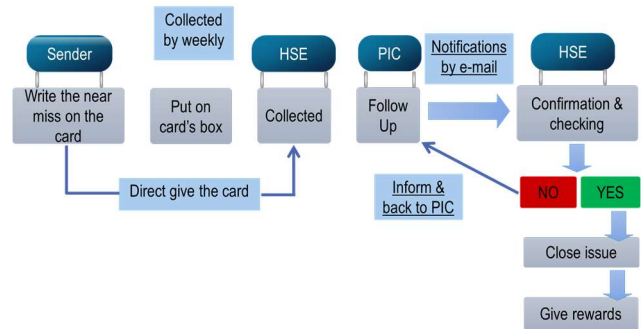


Fig. 2. The flow process of the near miss reporting uses a paper-based system at PT B

III. RESULT

Table I – VI is an accident and near miss data obtained during 3 years of observation in PT A and PT B.

TABLE I. PT A ACCIDENT DATA IN 2016

Data Validation	2016												Total
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	
Hours Worked	2936340	2512366	2461550	1666369	2244046	2872954	2904696	2594676	2716632	2833902	2830098	2726213	31299841
Lost Time Illnesses	0	0	0	0	0	0	0	0	0	0	0	0	0
Lost Time Injuries	0	3	1	2	0	4	2	2	0	3	2	4	23
Lost work days	0	3	1	8	0	11	15	4	0	31	3	15	91
Near Misses	26	34	26	61	152	158	38	179	246	423	358	614	2315
Recordable Illnesses	0	0	0	0	0	0	0	0	0	0	0	0	0
Recordable Injuries	3	9	7	5	4	10	2	5	5	5	6	6	67
Turnover Illnesses	0	0	0	0	0	0	0	0	0	0	0	0	0
Turnover Injuries	0	0	0	0	0	0	0	0	0	0	0	0	0

TABLE II PT B ACCIDENT DATA IN 2016

Data Validation	2016												Total
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	
Hours Worked	1338673	1328891	1337895	1329892	1328190	1302178	1290098	1325796	1335012	1325407	1322682	1335907	15900621
Lost Time Illnesses	0	0	0	0	0	0	0	0	0	0	0	0	0
Lost Time Injuries	1	2	1	3	1	2	0	1	2	0	0	2	15
Lost work days	4	13	3	2	2	32	30	34	8	0	0	6	134
Near Misses	10	8	12	11	11	16	10	9	13	12	15	16	143
Recordable Illnesses	0	0	0	0	0	0	0	0	0	0	0	0	0
Recordable Injuries	11	9	9	11	7	8	11	6	14	11	8	10	115
Turnover Illnesses	0	0	0	0	0	0	0	0	0	0	0	0	0
Turnover Injuries	0	0	0	0	0	0	0	0	0	0	0	0	0

TABLE III. PT A ACCIDENT DATA IN 2017

Data Validation	2017												Total
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	
Hours Worked	2516514	2421104	2682376	2413752	2303759	1796523	2384077	2393472	2058150	2329122	2283777	1980950	27563574
Lost Time Illnesses	0	0	0	0	0	0	0	0	0	0	0	0	0
Lost Time Injuries	1	0	1	2	1	0	0	1	0	3	1	3	13
Lost work days	30	0	16	6	1	0	0	21	0	5	1	9	89
Near Misses	525	504	370	393	374	338	509	803	581	659	720	525	6301
Recordable Illnesses	0	0	0	0	0	0	0	0	0	0	0	0	0
Recordable Injuries	4	4	3	5	3	5	2	2	1	4	2	3	38
Turnover Illnesses	0	0	0	0	0	0	0	0	0	0	0	0	0
Turnover Injuries	0	0	0	0	0	0	0	0	0	0	0	0	0

TABLE IV. PT B ACCIDENT DATA IN 2017

Data Validation	2017												Total
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	
Hours Worked	1285352	1262687	1265469	1300012	1265781	1239978	1222178	1255469	1276521	1277851	1298734	1291162	15241194
Lost Time Illnesses	0	0	0	0	0	0	0	0	0	0	0	0	0
Lost Time Injuries	0	0	1	0	0	0	0	0	0	0	0	3	4
Lost work days	0	0	2	0	0	0	0	0	0	0	0	19	21
Near Misses	15	28	16	13	8	11	19	15	18	14	21	17	195
Recordable Illnesses	0	0	0	0	0	0	0	0	0	0	0	0	0
Recordable Injuries	4	10	8	7	12	6	5	5	18	10	12	9	106
Turnover Illnesses	0	0	0	0	0	0	0	0	0	0	0	0	0
Turnover Injuries	0	0	0	0	0	0	0	0	0	0	0	0	0

TABLE V. PT A ACCIDENT DATA IN 2018

Data Validation	2018												Total
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	
Hours Worked	2284101	2006657	2209145	2130170	2129831	1396042	2332330	2255391	2301823	2649557	2599607	2510215	26804866
Lost Time Illnesses	0	0	0	0	0	0	0	0	0	0	0	0	0
Lost Time Injuries	4	0	1	1	0	0	2	2	1	3	1	0	15
Lost work days	6	0	2	40	0	0	2	23	1	32	12	0	118
Near Misses	682	554	766	579	466	186	398	523	408	437	392	401	5792
Recordable Illnesses	0	0	0	0	0	0	0	0	0	0	0	0	0
Recordable Injuries	6	1	5	2	2	2	2	2	2	4	1	2	31
Turnover Illnesses	0	0	0	0	0	0	0	0	0	0	0	0	0
Turnover Injuries	0	0	0	0	0	0	0	0	0	0	0	0	0

TABLE VI. PT B ACCIDENT DATA IN 2018

Data Validation	2018												Total
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	
Hours Worked	1148921	1147642	1146721	1158531	1149762	1120779	653081	691078	755098	761262	767089	789200	11289164
Lost Time Illnesses	0	0	0	0	0	0	0	0	0	0	0	0	0
Lost Time Injuries	0	1	0	1	2	0	0	0	2	0	0	0	6
Lost work days	0	7	0	3	27	0	0	0	16	0	0	0	53
Near Misses	18	22	25	20	21	24	20	21	19	21	26	19	256
Recordable Illnesses	0	0	0	0	0	0	0	0	0	0	0	0	0
Recordable Injuries	5	9	7	11	11	2	4	3	6	6	6	1	71
Turnover Illnesses	0	0	0	0	0	0	0	0	0	0	0	0	0
Turnover Injuries	0	0	0	0	0	0	0	0	0	0	0	0	0

IV. DISCUSSION

A common assumption that currently underlies safety analysis approaches in industrial and high-hazard organizations is that the reporting of near-miss events can contribute towards accident prevention. Specifically, when information on near miss events is available, managers can analyze it, identify risk factors, and then act to reduce the risk, thereby preventing more severe accidents from occurring. To be effective, such an analysis must be grounded in an objective evaluation of the event, the outcome, and the severity of the alternative outcome's consequences [7]. A near miss has many of the ingredients of unsafe behaviors and unsafe conditions of a real accident sequence with the exception of a few missing ones, thereby preventing a near-miss incident for further escalating and leading to the accident and its dire consequences [8].

Based on occupational accident data obtained for 3 years, companies that use web-based for near miss reporting have an accident rate of 78.04% lower than companies that use paper for near miss reporting. In addition to the lower accident rate, the decrease in accidents in companies that use web-based for near miss reporting is 4.15% higher compared to companies that use paper for near miss reporting.

For 3 years PT A reduced the incident rate by 45.97%, in 2016 the incident rate was 0.43 and dropped to 0.23 in 2018. Whereas the PT B incident rate dropped by 13.04%, in 2016 the incident rate was 1.46 and in 2018 it fell to 1.26. Fig 3 show the recordable accident rate for both company.

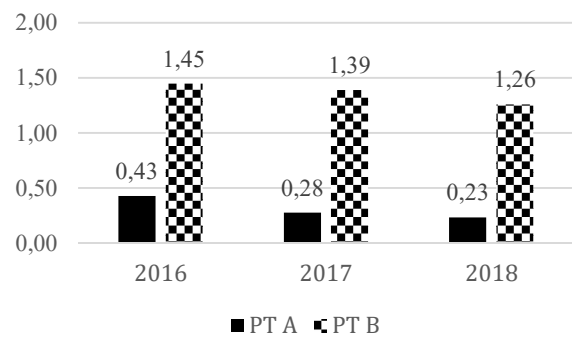


Fig. 3. Recordable Incident Rate

Gathering near miss, determining causes, correction and communicate the hazards can help reduce and decrease incidents and injury rates [9]. Both companies use different ways to do near miss reporting. Companies that use web-based in near miss reporting can capture 91.43% more near miss than companies that use paper to do near miss reporting, like showing in the fig 4. The use of a web-based reporting system makes it easy for workers to report the near miss that found in the work area. In addition to the ease of accessing media reporting, web-based system usage also speeds up the reported follow-up process from near miss.

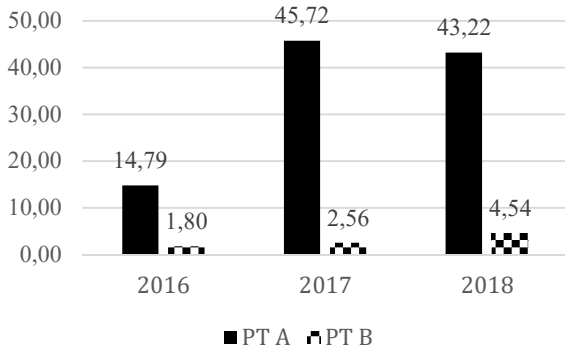


Fig. 4. Near Miss Report Rate

The method applied in near miss reporting is manual when compared to online methods, making the response to follow up on near miss causes longer, and this is an opportunity for an accident to occur. Companies that use web-based system can receive reports shortly after near miss occurs or is found, so that the person in charge of the area can immediately take corrective action. Fast corrective actions can reduce the chance of an accident. Companies that use cards for reporting take one week to find out the cause of near miss, and it is possible for the same accident occur during the waiting period between workers reporting near miss through the box and the time the card is taken by the person in charge of the program.

The person in charge of the program can receive notification emails when there are near miss reported by workers via email. Furthermore, the person in charge of the program continues to the person in charge of the area to follow up on the near miss found. The notification email shown in the fig. 5.

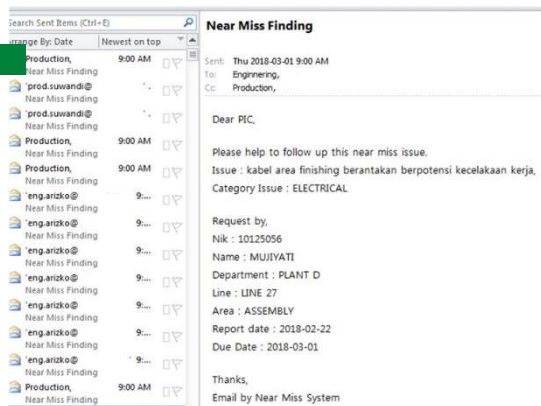


Fig. 5. Email notification from the person in charge of the program to the person in charge of the area.

The person in charge of the area confirms and follows up in the form of corrective actions for near miss found. After the correction are carried out, the person in charge of the area must send an e-mail to proof of the corrective action related to the near miss. The confirmation email shown in the fig. 6.

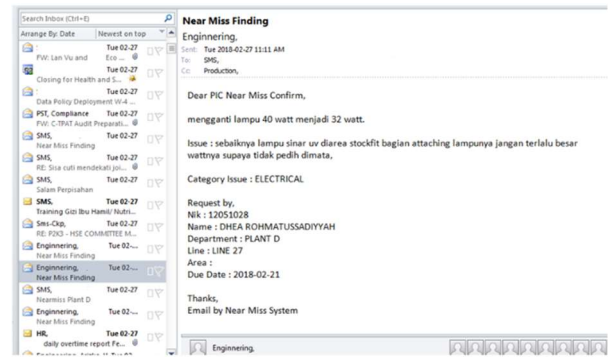


Fig. 6. Email to proof the confirmation from the person in charge of the area related to near miss follow-up found

Near miss that found not only communicated between the person in charge of the area and the person in charge of the program. But all workers can access and find the status of near miss found, like shown in fig 7.

ID	NAME	PLANT/DEPT	LINE	AREA	SUGGESTION	CATEGORY	SCORE	STATUS	PIC
101240	SUSANA KALIBATO	PLANT D	LINE 25	CUTTING	perbaikan alat ukur ketebalan...	ELECTRICAL	1 1 1 3	141400	SHARIFOROHAN@PT...
101264	HAIRI ANJAM	PLANT D	LINE 21	ASSEMBLY	alat ukur tidak terkalibrasi...	ELECTRICAL	1 1 1 3	141300	SHARIFOROHAN@PT...
101267	PRABUDI	PLANT D	LINE 11	ASSEMBLY	alat ukur tidak terkalibrasi...	ELECTRICAL	2 2 2 6	141300	SHARIFOROHAN@PT...
101270	PITU SOEWARJO	PLANT D	LINE 26	ASSEMBLY	alat ukur tidak terkalibrasi...	MECHANICAL	1 1 1 3	141300	SHARIFOROHAN@PT...

- Not Confirm : Has been received by HSE team but has not been given an assessment and give to the PIC.
- Confirm : Suggestion/ issue have been received by PIC but not reviewed yet.
- Follow Up : PIC already follow up but not checked yet by HSE.
- Close : Already checked by HSE team and issue has been closed.

Fig. 7. Near miss status communication platform

Website development may be a challenge for workers [10]. Initially there were concerns regarding the use of web-based reporting systems that would be difficult to implement, but for 3 years there was an increase in the number of near miss reported. Most workers do not feel that this report is too difficult, does not take longer than making a written report. The display of information received is more visually attractive, easier to read and more interactive than written reports [11].

In companies that use paper near miss report, it takes longer to make improvements. Fig 8 shown the sample paper form and the box for collecting near miss. Near miss report cards are collected by the person in charge of the program once a week, then distributed using e-mail to each person in charge of the area to be followed up. Accidents can occur between the times the report is collected until the report is collected, because of near miss causes that have not been followed up.

