

# Analysis of Smk3 Application in a Hospital Using the FTA Method

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Hospital conditions that are closely related to human conditions, especially occupational safety and health of patients and workers in hospitals, make it a necessity for the application of SMK3 in a Hospital. The purpose of this study is to identify the potential risks of work accidents that might occur with the fishbone method diagram to be analyzed related to the factors - man, machine, method, measurement, material, and environment. Furthermore, a calculation using the Likert method is used to get the main factor. Results show that the most important factor compared to the total obtained is the man factor; that has the highest importance level of 46%. Further analysis of the man factor, using the FTA method, is used to get the main causes of occupational risk as well as appropriate preventive measures from the risk of work accidents that might occur. Further, this article presents recommendations for the implementation of SMK3 and recommendations for controlling forms of potential work accidents in the form of poster designs.

**Key words:** *SMK3, FTA, Fishbone, Likert, Risk.*

## Introduction

A good work culture must pay attention and make Occupational Safety and Health (K3) the main points to be applied and improved. So that a K3 management system is an obligation that must be fulfilled and must be implemented within agencies and companies. Therefore, Occupational Safety and Health (K3) becomes a field that must exist within an agency or company. This is due to the right of each individual employee or worker to feel safe and comfortable. One of the agencies that has an important role in improving and building a Safety and Health (K3) management system is the hospital. The hospital plays an important role and must have a good OSH management system because the hospital has many elements that are bound and have a high level of importance in terms of safety and comfort. Some of the elements



in question are the presence of patients, doctors, employees etc. Important points at the center of Occupational Safety and Health (K3) are patients or hospital visitors who may use some of the facilities or operations provided by the hospital. Therefore, the hospital must have a good and correct Occupational Safety and Health (K3) management system, a system that is able to have a positive impact on all parties and not to forget the goals of the SMK3 itself, namely to increase work productivity and improve work efficiency.

Hospital X is one of the hospitals in the city of Malang, East Java. Hospital X is a hospital that is concerned with the needs of the health facilities and services for patients or hospital visitors. So this requires the Hospital X to further improve the operations provided. The services and operations provided are not only for the distribution and availability of health facilities, but also for services that can meet high quality service standards that can later become hospitals that can be trusted by the general public, especially in the city of Malang. Hospital X is a private standard hospital and has an official permit to open. Hospital X has a goal that is more focused on the interests of patients in providing excellent health services beyond expectations.

Hospital X requires several Occupational Safety and Health Management Systems (SMK3) that are in accordance with current conditions and are able to achieve expectations in accordance with existing standards. Renewal of the SMK3 standard needs to be done to reduce the high level of accidents and the probability of injury from work accidents. In this case, hospitals in Indonesia are still far from being well positioned, both in terms of services, operations, and performance provided. The following is data obtained from webometrics in order to rank good hospital services.

As reported by the webometrics website, Hospital number 1 in Indonesia is ranked 3858 in the world class and already has international-standard facilities, facilities and infrastructure. From the data obtained, the number 1 hospital in Indonesia ranks 3858 in the world ranking conducted by webometrics. Mitra Keluarga Group Hospital ranks 3858 internationally recognized. Mitra Keluarga Group Hospital occupies the number 1 position in Indonesia in terms of services and operations provided. In this case, Indonesia is still considered to be far from a good word in terms of services provided so that some improvements are needed in terms of the Occupational Safety and Health Management System (SMK3). So that the expected target of Indonesia can occupy the top 100 positions in the world ranking of service levels in the world.

This research uses the Fault Tree Analysis (FTA) method where this method is used before the calculation of the analysis data using SEM application which aims to obtain the level of work accidents as well as the comfort felt by patients and workers at X Hospital. After obtaining the results of the SEM application, conducted further analysis using fishbone diagrams in order to obtain the factors that become the main problems in the occurrence of workplace accidents

consisting of factors man, machine, method, measurement, material and environment. After obtaining the results from the analysis of the fishbone diagram, a calculation using a linkert scale is carried out in order to obtain quantitative values from the fishbone diagram. After obtaining the main cause or factor, then proceed with the analysis using the Fault Tree Analysis method in order to obtain points from the more specific main factors.

This research focuses on facility policy and the application of other aspects that can support the unity of the Occupational Safety and Health Management System (SMK3) at Hospital X. Researchers will analyze using the FTA method that can help identify and analyze the risks that may occur and cause losses to several parties. Thus it can be seen that there is a mismatch in the application of SMK3 in hospitals. So that researchers can provide some recommendations for improvement of the nonconformities obtained and become an input for Hospital X to prepare for SMK3 certification.

## Research Method

Data obtained from this research is by giving several questionnaires to the employees in Hospital X. The questionnaire given was 100 in order to represent the total population of the employees in X Hospital. Following are the questionnaires given to employees at X Hospital.

**Image 2.** First Page Questionnaire

KUESIONER PENELITIAN	
PENERAPAN SISTEM MANAJEMEN KESELAMATAN DAN KESEHATAN KERJA (SMK3) DENGAN MENGGUNAKAN METODE HAZARD IDENTIFICATION RISK ASSESSMENT (HIRA)	
<b>I. IDENTITAS RESPONDEN</b>	
1. No. Responden	:
2. Nama	:
3. Umur	:
4. Jenis Kelamin	: a. Laki-laki      b. Perempuan (Lingkari salah satu)
5. Pendidikan Terakhir	: a. SLTA (Sederajat) b. Diploma c. Sarjana (S1) d. PascaSarjana(S2) (Lingkari salah satu)
6. Masa Kerja	:
7. Jabatan	:
8. Kecelakaan 3 Tahun Terakhir	: a. Pernah      b. Tidak Pernah (Lingkari salah satu)
9. Jenis Kecelakaan	: a. Terpeleset      b. Terjatuh c. Tertimpa      d. Lainnya..... (Lingkari salah satu)

**Image 3. Second Page Questionnaire**

**PETUNJUK PENGISIAN KUESIONER**

- Pilihlah jawaban dengan memberikan tanda checkist (✓) pada salah satu jawaban yang paling sesuai menurut anda.
- Setiap pernyataan hanya membutuhkan satu jawaban saja.
- Mohon memberikan jawaban yang sebenarnya.
- Setelah melakukan pengisian, mohon Bapak/Ibu mengembalikan kepada yang menyerahkan kuesioner

**II. DAFTAR PERTANYAAN**

**Penerapan SMK3**

No.	Pertanyaan	YA	TIDAK
<b>Fundamental Safe Work Practice (FSWP)</b>			
1	Apakah setiap pekerjaan memiliki SOP?		
2	Apakah Anda mengetahui prosedur pekerjaan Anda?		
3	Apakah Anda selalu mengikuti SOP dalam bekerja?		
4	Anda tidak mengalami kecelakaan kerja karena bekerja sesuai SOP?		
5	Pernahkah Anda mengikuti pelatihan Keselamatan dan Kesehatan Kerja?		
6	Apakah penempatan rambu-rambu keselamatan dan pintu darurat telah dibuat dengan jelas?		
7	Adakah ada tim yang mengawasi pekerjaan agar dilaksanakan secara aman dan mengikuti setiap prosedur kerja yang telah ditetapkan?		
8	Apakah Anda dilibatkan secara aktif dalam setiap program Keselamatan dan Kesehatan Kerja?		
9	Apakah informasi terbaru mengenai Keselamatan Kerja disosialisasikan secara cepat?		

**Image 4. Third Page Questionnaire**

10	Apakah sarana dan prasarana pendukung program Keselamatan Kerja tersedia?		
11	Apakah Anda mendapat pelatihan cara menggunakan dan memelihara Alat Pelindung Diri (APD) secara benar?		
12	Apakah Anda selalu menggunakan APD pada saat bekerja?		
13	Anda tidak pernah mendapatkan teguran karena menggunakan APD lengkap saat bekerja?		
14	Anda tidak pernah mengalami kecelakaan kerja karena menggunakan APD?		
15	Apakah Anda mengikuti pemeriksaan kesehatan secara berkala?		
<b>Behaviour Based Safety (BBS)</b>			
16	Anda berperilaku aman saat bekerja?		
17	Anda tidak pernah mendapat teguran karena berperilaku aman pada saat sedang bekerja?		
18	Apakah Anda pernah mendapat pengarahan untuk berperilaku aman pada saat bekerja?		
19	Anda tidak pernah mengalami kecelakaan karena berhenti bekerja ketika Anda mengetahui kondisi pekerjaan tidak aman?		
<b>Hazard Identification (HAZID)</b>			
20	Apakah Anda pernah mendapatkan pelatihan tentang bahaya dan cara penanggulangannya?		
21	Adakah tim yang mengawasi dalam melakukan identifikasi bahaya di lingkungan kerja?		
22	Apakah Anda mendapat arahan tentang bahayabahaya yang terdapat di lingkungan kerja?		

**Image 5.** Fourth Page Questionnaire

23	Adakah tim yang melakukan pengujian lingkungan kerja secara berkala (pengujian kualitas bising mesin, kualitas udara di lingkungan kerja, pengujian kualitas pencahayaan)?		
<b>Stop Work Authority (SWA)</b>			
24	Apakah perusahaan memberikan reaksi yang cepat dan tepat terhadap kondisi yang menyimpang?		
25	Adakah perintah untuk berhenti bekerja jika kondisi pekerjaan tidak aman?		
26	Pernahkah Anda menyuruh rekan kerja di tempat kerja Anda untuk berhenti bekerja akibat kondisi pekerjaan yang tidak aman?		
27	Anda tidak mendapat kecelakaan kerja karena berhenti bekerja ketika Anda sudah mendapat peringatan untuk berhenti bekerja?		
<b>Self Stop Work Authority (SSWA)</b>			
28	Apakah Anda akan berhenti melakukan pekerjaan jika pekerjaan tersebut tidak aman?		
29	Anda tidak melanjutkan pekerjaan yang menurut anda berisiko?		

After the questionnaire was given to the employees at X Hospital, an analysis was then carried out using the SEM application to make qualitative data quantitative and test the validity of the data obtained. After SEM analysis, the results are obtained in the form of accident rates that occur in X Hospital and continued with fishbone diagrams in order to get the main factors of work accident causes in terms of man, machine, method, measurement, material and environment. So the data can be calculated on a linkert scale to get one main factor out of the six factors. After getting 1 main factor, an analysis is carried out using Fault Tree Analysis in order to obtain points from the more specific main factors so that the writer can provide conclusions and suggestions for improvement that can be given to RS X.

## Result

The following is a table that has been obtained and inferred from the results of the distribution of questionnaires to employees at Hospital X.

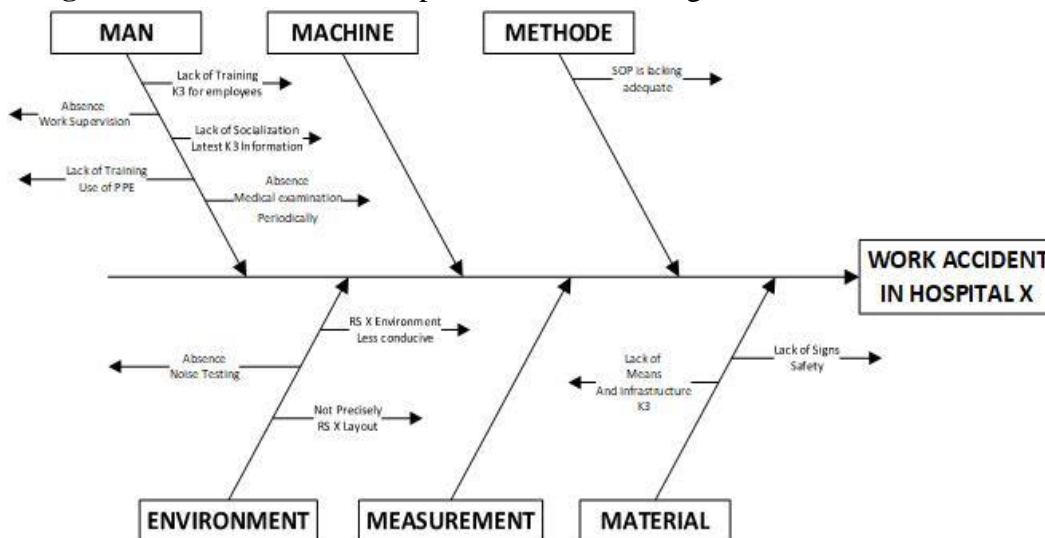
**Table 1:** Summary of Results for Questionnaire Answers

Answers	Yes	No
Percentage	48,48%	51,52%

From the summary table above, the answer "Yes" is the total answer to the absence of work accident problems or comfort problems to Hospital X. For the answer "No" is the total answer to the existence of work accident problems or comfort problems to Hospital X. So that it can the conclusion is that the value of work accidents is higher than the value of no work accidents, which is 51.52%.

After getting the results in the form of conclusions from the questionnaire that has been given to the employees at Hospital X, a further analysis will be carried out using fishbone diagrams to obtain the main factors that influence the occurrence of work accidents and lack of comfort in working. The following is a fishbone diagram that has been analyzed through the conclusion of the questionnaire.

**Image 6.** Work Accident at Hospital X Fishbone Diagram



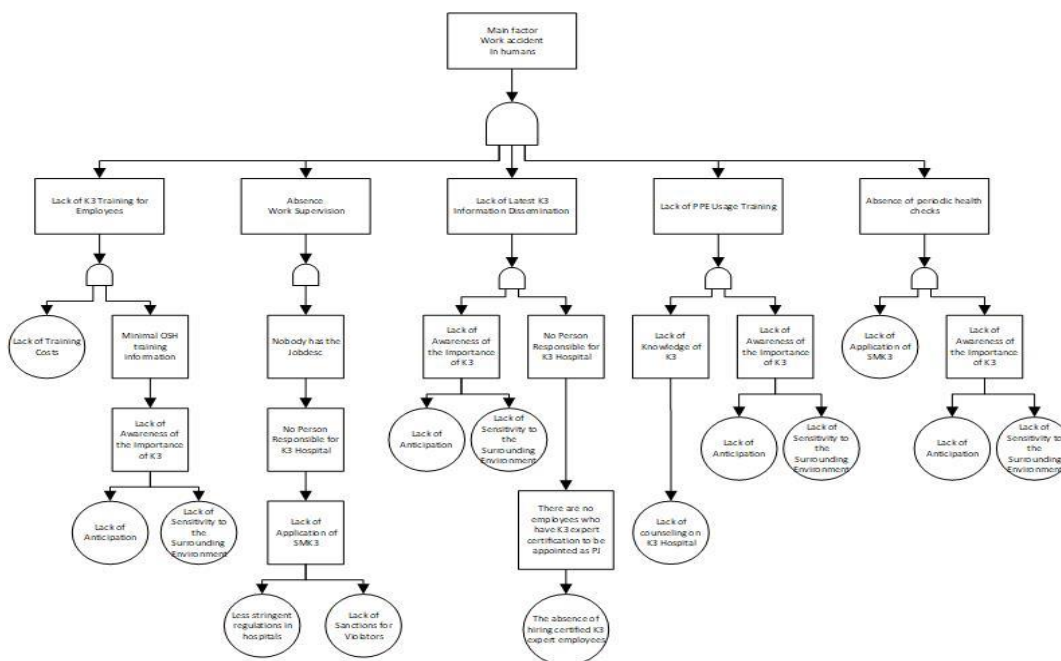
After an analysis using a fishbone diagram, the importance of each factor is calculated using the linkert scale. Of each supporting factors of the main factors divided by the total supporting factors that meet the work accident at Hospital X. The following table will present the importance level of each factor in the fishbone diagram.

**Table 2:** Likert Scale Calculation Results

NO.	Factor	Total	Percentage
1.	Man	5	46%
2.	Machine	0	0%
3.	Method	1	9%
4.	Measurement	0	0%
5.	Material	2	18%
6.	Environment	3	27%
<b>Total</b>		11	100%

From the above table it can be concluded that the Man factor has the highest value in the level of importance or the most influential factor in the occurrence of work accidents or comfort in working at Hospital X, with a value of 46%. So that further analysis is needed by using the Fault Tree Analysis of the Man factor in order to find out the specific causes of the Man factor. This is done so that the actions or suggestions given for improvements can be on target and reduce the risk of ongoing workplace accidents and make conditions at Hospital X to be more comfortable. Here is a Fault Tree Analysis of human factors.

**Image 7.** Fault Tree Analysis of Man Factor



After analyzing using the Fault Tree Analysis method, the result is a circle symbol, which is the main cause of the error referred to in the square symbol. So that the solutions provided are sourced from all circle symbols in the FTA and make the solutions or suggestions for improvement given on target.

## Discussion

The results of the above analysis are in the form of several main causes or major problems of work accidents and discomfort that occur at Hospital X. So that it is necessary to suggest some improvements or recommendations for improvement so that the suggestions given by the author can be used as a reference or basis for making improvements. The following are some of the main causes or main problems that have been obtained from Fault Tree Analysis:

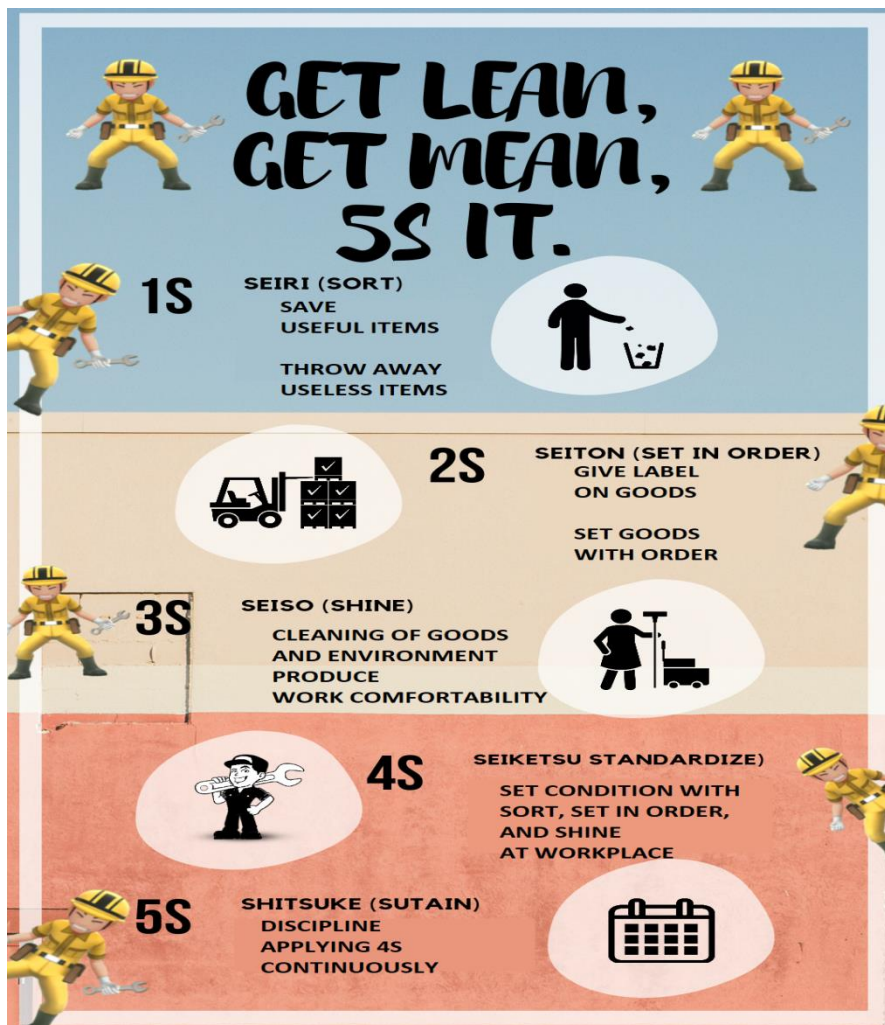
1. Lack of K3 training costs
2. Lack of awareness of the importance of K3
3. The absence of the application of SMK3
4. There is no person responsible for K3 RS X
5. Lack of K3 knowledge

From some of the main causes above, the authors provide some recommendations for improvement to the X Hospital in order to become a reference or basis for making improvements.

1. The existence of the application of SMK3 in Hospital X. The function of SMK3 is to reduce or prevent work accidents that can result in losses for individual employees as well as losses for the X Hospital. SMK3 is also able to overcome the problems that arise from various other factors.
2. K3 training is required. This serves to prevent and become a reference in every activity carried out by every employee of Hospital X.
3. There needs to be a leader or person who serves as the head of OSH at Hospital X. The head of OSH functions as a person who is able to supervise and maintain every employee's work activities to keep them safe and comfortable, and can be responsible for matters related to OSH at Hospital X.
4. The author provides a poster recommendation to be placed on several walls in Hospital X, so that it can be a reminder or reminder for employees to always maintain order, comfort, and conducive conditions. The following is a poster created by the author.

### Image 8. 5S Recommendation Poster





## Summary

Recommendations for improvement given are the implementation of SMK3. This can prevent unwanted things for Hospital X, such as human error or work accidents, as well as damage that can add more expenses for Hospital X. These improvement recommendations can also have a positive effect on employees, agencies, and for patients that is gaining the trust of patients because they feel there is security and comfort in every process so that patients will trust Hospital X in doing their job.

Recommendations for improvement are given so that the application is more optimal, a poster is needed. Previously at Hospital X there had not been given any poster that could be a reminder for the workers.

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