A Conceptual Design for Smart Risk Assessment

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Abstract. Technology cannot be separated from the development of Industry 4.0 in which smart working is the focus. One of the company's activities that helps the company to achieve its quality goals and objectives is risk management. Based on observations of one SMEs, poor risk management is still found. The risks that occur have not been identified, assessed, and treated appropriately. In addition, documentation that has not been conducted makes the risks that occur later not be handled properly. The aim of this study is to develop a conceptual model of smart risk assessment. The step of this research includes identifying stake holders (as users), identifying functional design, designing context diagram (CD) and data flow diagram (DFD), and designing fidelity prototype. The users involve the production manager, operational manager, and director. The functional design integrates stake holders' requirements and ISO 31000:2018 risk management process. The design of fidelity prototype focuses on risk assessment, risk treatment, and documentation of risk management. This application is expected to become one of the sustainable development and information systems on Industries.

1 Introduction

In recent years, information and communication technology or ICT has significant experience in its development. Technology cannot be separated from the development of Industry 4.0 in which smart working is the focus [1]. Employees are required to be able to work flexibly and adaptively in a highly dynamic work environment [2]. This requires tools and approaches that can easily be put into practice. The use of mobile technology, which is gaining great interest [3], can be used to develop processes to improve industrial performance. One of the processes is in the risk management process.

Institute of Risk Management defined risk management as process that aims to help organizations understand, evaluate, and act on the risks with a view to increasing the probability of success and reducing the likelihood of failure [4]. Also, risk is the uncertainty of an event occurring that could have an impact on the achievement of the objectives. Therefore, a risk assessment is very important to be carried out to determine the level of risk and to determine the possibility of occurrence and impact of an event that resist the achievement of organizational goals or objectives so that proper risk management can be carried out.

According to ISO 31000:2018, the risk management process includes policies, procedures, and approaches in carrying out the process of communicating, evaluating, managing, monitoring, reviewing, recording, and reporting of risks to stakeholders [5]. ISO 31000:2018 is a framework that is widely used to determine the appropriate risk treatment for several risks that are considered to need attention. Some research used ISO 31000:2018 framework to design risk management system on material handling services [6] and steel pipe production process [7], and determine the security level of information technology [8]. Figure 1 shows the risk management process based on ISO 31000:2018.

Fig. 1. Risk Management Process Based on ISO 31000:2018 [5]

Risk assessment is a method for determining and assessing risks that will occur. Risk assessment consists of 3 stages, namely risk identification, risk analysis, and risk evaluation. Risk identification is to identify any risks
of the company who must know the risks and play an important role in making decisions in following up the risks that have been identified.

### 3.2 Identifying the Functional Design

Table 1 shows the stake holders’ requirement. Figure 1 shows the functional design that integrates between stake holders’ requirements and ISO 31000:2018 framework.

<table>
<thead>
<tr>
<th>Stake Holders</th>
<th>Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Production Manager</td>
<td>● Input risk</td>
</tr>
<tr>
<td></td>
<td>● Input source of risk and consequences</td>
</tr>
<tr>
<td></td>
<td>● Access the archives (documentation of the risk assessment)</td>
</tr>
<tr>
<td></td>
<td>● Access the risk treatment</td>
</tr>
<tr>
<td>Operational Manager</td>
<td>● Input risk</td>
</tr>
<tr>
<td></td>
<td>● Input source of risk and consequences</td>
</tr>
<tr>
<td></td>
<td>● Assess or analyze the risk</td>
</tr>
<tr>
<td></td>
<td>● Submit the risk assessment</td>
</tr>
<tr>
<td></td>
<td>● Access the archives (documentation of the risk assessment)</td>
</tr>
<tr>
<td></td>
<td>● Access the risk treatment</td>
</tr>
<tr>
<td></td>
<td>● Input the recommendation of treatment</td>
</tr>
<tr>
<td>Director</td>
<td>● Access the archives (documentation of the risk assessment)</td>
</tr>
<tr>
<td></td>
<td>● Input the recommendation of treatment</td>
</tr>
<tr>
<td></td>
<td>● Approve or reject the recommendation of treatment</td>
</tr>
</tbody>
</table>

#### 2 Method

The conceptual model is the first step of developing the smart risk assessment application. The step of this research includes identifying stake holders (as users), identifying functional design, designing context diagram (CD) and data flow diagram (DFD), and designing fidelity prototype. For stake holders’ identification, the interview method was conducted in one of the small medium enterprises that is object of this research. For identifying functional design, ISO 31000:2018 risk management process and Fault Tree Analysis were used as a framework. The focus group discussion was also used to get the stake holders requirement as support data for the design. For designing fidelity prototypes, Balsamiq Wireframes software is used to get the display.

#### 3 Result and Discussion

##### 3.1 Stake Holders Identification

Stake holders were identified as users for this application. Based on the interview, there are production manager, operational manager (auditor), and director (owner) who are involved in the risk management process. The production manager is an interested party that deals directly with the risks that occur during the production process. The operational manager is the party who monitors and evaluates the company’s operations. This party has the role of an auditor. The director is the owner of the company who must know the risks and play an important role in making decisions in following up the risks that have been identified.
From the integration above, the functional design was divided into login function, input for risk identification, input for risk analysis, input for risk treatment, and archive function. The functional design can be described below:

1. Login function.
The system provides list of roles (production manager, operational manager, and director)

2. Input for risk identification.
   - Production manager and operational manager input the risk, the source of risk, and the consequences.
   - The system will process the risk data.
   - The system shows the FTA.
   - The system will store the data.

3. Input for risk analysis
   - Operational manager input the score of severity and likelihood.
   - The system will process the risk analysis.
   - The system shows the risk score and risk level.
   - The system will store the data.

4. Input for risk treatment
   - Operational manager and director input the risk treatment.
   - The system will store the data.

5. Archive function
   - The system will show the data.
   - Production manager, operational manager, and director access the archive of risk assessments.
   - Production manager and operational manager access the final treatment that be approved by director.
   - All roles have a function to update the risk data.
   - The system will store the data.

3.3 Designing Context Diagram and Data Flow Diagram

Figure 3 shows the Context Diagram of Smart Risk Assessment based on the functional design above. Figure 4(a-b) show the example data flow diagram, including DFD for login function and DFD for risk identification.

3.4 Designing Low Fidelity Prototype

The displays of low fidelity prototype are divided based on roles. Before going to the main function, there is the login function that separates roles based on the username and password registered in the system. Figure 5a shows the form login. There are username and password that must be filled in by user. After the system processes the data input, the homepage will appear based on the production manager, operational manager, or director’s role (Figure 5b).
The main menu is submission and archive. For production manager, the submission menu consists of risk identification form (Figure 6a-b). For operational manager, the submission menu consists of risk identification form, risk analysis form, and risk treatment form (Figure 6a-d). In the risk identification form, production and operational manager input the risk, choose the objective (quality or productivity), input the source of risk, and input the risk considerations. In the risk analysis, operational manager inputs severity and likelihood score. The system will display the risk score and risk level immediately. In the risk treatment, operational manager inputs the recommendation of the risk treatment based on the risk evaluation.

For the director, the submission consists of the risk treatment data record that has been submitted by the operational manager. The director will input new recommendation of the risk treatment also accept or reject the recommendation (Figure 7a-b).

Figure 8a-d show the archive menu. The system will show the all-risk data. In risk identification, FTA will be shown based on the source of risk. All roles have a function to update the risk data.
4 Conclusion

This research develops the conceptual model of smart risk assessment. The users involve the production manager, operational manager, and director. The functional design integrates stakeholders’ requirements and ISO 31000:2018 risk management process. FTA identifies all possible faults for each risk. The main function of this application is to assess the risk, give the risk treatment, and record the risk treatment. Future research must develop the mobile-based application. This application is expected to become one of the sustainable development and information systems on Industries.

Reference