

# Risk Analysis using Risk Failure Mode and Effect in Implementation of Integrated Digital Reporting with Power BI Dashboard

Bagus Wickra Dytha<sup>1,2\*</sup>, Tatang Akhmad Taufik<sup>3</sup>

## ABSTRACT

*Implementing digital reporting integration with Power BI Dashboard benefits companies in obtaining accurate and real-time information regarding their business performance. However, in implementing this integration, several risks must be analyzed to reduce the possibility of failure in the integration process. The risk analysis method used in this research is Risk Failure Mode and Effect Analysis (RFMEA). This study uses RFMEA to identify and evaluate risks that may occur in implementing digital reporting integration with the Power BI Dashboard. The risk analysis results show that 19 potential risks must be considered in implementing this integration. These risks include problems with data input errors, resistance to changes in reporting, lack of training and education on using dashboards, vulnerable data security, limited technical support, and so on. To reduce the risks, several mitigation strategies are proposed. These strategies include providing training, socializing dashboards, implementing security protocols, and reviewing work contracts. By identifying and evaluating the risks, the company can take appropriate mitigation measures to minimize the possibility of failure in the integration process.*

**KEYWORDS:** Digitalization, Risk Management, RFMEA, Power BI Dashboard.

<sup>1</sup>Head of Project Delivery, PT Nokia Solutions and Networks Indonesia, Jakarta, Indonesia

<sup>2</sup>Technomarketing, Interdisciplinary School of Management and Technology, Institut Teknologi Sepuluh Nopember, Surabaya, Indonesia

<sup>3</sup>Department of Business Management, Institut Teknologi Sepuluh Nopember, Surabaya, Indonesia

\*Corresponding author: bagus.wickradytha@gmail.com

### 1. INTRODUCTION

Digitalization has brought significant changes to almost all aspects of life, including business and project management. Digitalization can be defined as the transformation process from analog to digital, in which digital technology is used to customize how an organization works, interacts with customers, and manages projects (Parviainen et al., 2017).

In project management, digitalization has provided new opportunities for managing projects effectively and efficiently. Digital technologies such as project management software, collaboration platforms, and mobile applications have helped increase productivity, reduce costs, and accelerate project turnaround time (Vial, 2019).

Reporting on the progress of a project will be very effective and efficient with a digitally integrated report that can be accessed anywhere quickly and accurately. With the change in the hybrid work model, it is necessary to have systematic reporting in one platform that is easy to access.

Hybrid working or working in a hybrid manner, namely a work pattern in which work is carried out with flexibility both from the office and from home, is increasingly becoming a trend in the world of work today. Additionally, the need for digitally integrated reporting is becoming increasingly important for companies. digital

In hybrid working conditions, teams or employees can work from various locations. It means that collecting data for reporting purposes can take more work. In situations like this, digitally integrated reporting becomes very important. Employees can enter data easily from any location using a digital reporting platform integrated with company systems. In addition, digital reporting platforms can also collect data automatically from various sources, including applications used by employees inside and outside the office.

In a centralized work situation in the office, reporting is usually done manually or through a separate document format and reported via email. However, in a hybrid working condition, reporting is done manually in separate ways or even through printed documents, which can hamper the efficiency and accuracy of reporting. Using digital reporting platforms can help companies achieve higher efficiency and accuracy in reporting. Digital reporting platforms can collect data automatically and directly integrate it with existing systems in the company.

Digitally integrated reporting can also help companies overcome coordination problems between teams that occur when working in a hybrid manner. By using a digital reporting platform, managers can easily track the work progress of employees and teams in real time. It can help managers to identify problems and provide solutions quickly.

When there is a change towards data reporting from separate manuals to digitally integrated report data, there is a potential for risks arising from these changes. The risk here is the potential to gain or lose something of value. Value can be gained or lost when taking risks resulting from given, foreseen, or unexpected actions or inactions (Stamatis, 2003).

Failure Mode and Effect Analysis (FMEA) systematically analyzes and ranks the risks associated with various product or process failure modes. In this method, prioritization of corrective actions is determined based on the highest rating, and evaluation is carried out until the improvement results reach an acceptable level (Barends et al., 2012). So, this research is expected to produce information about risks that can occur in project implementation and can provide an assessment and mitigation of identified risks, especially dominant risks, so that project objectives can be achieved. Evaluation analysis can use two stages. The first uses previous data, and the second uses reliability engineering that can be used to identify and determine failure (Stamatis, 2019).

## 2. LITERATURE REVIEW

### Risk Management

Risk affects the deviation from a project's objectives (plan) with its realization in the field (Raftery, 2003). Risks can occur in all projects; risks cannot be ignored but can be reduced, transferred to other parties, and controlled, but risks cannot be ignored. So, to understand risk and how to analyze, mitigate and control it systematically so that project objectives within the scope of cost, time, and quality can be achieved. In the opinion of (Vaughan & Vaughan, 2013) the basic purpose of risk management is to plan and implement procedures to minimize the negative impact if the project occurs.

According to the Project Management Body of Knowledge (PMBOK) (Project Management Institute, 2017), there are three definitions of risk:

- Risk management is a formal process by which risk factors are a system of identification, assessment, and determination.
- Risk management is a formal systematic method of management that concentrates on identifying and controlling activities or activities that have the potential to cause change.
- Risk management in the project context is the art and science of identifying and responding to risk factors for the whole life of a project.

While the stages in the risk management process based on PMBOK include:

- Risk management planning
- Risk identification
- Qualitative risk analysis
- Quantitative risk analysis
- Risk response planning
- Risk Control

### Failure Mode and Effect Analysis (FMEA)

FMEA is a systematic method for analyzing and assessing the risks associated with various product or process failure modes, prioritizing corrective actions at the highest level, and evaluating them until the corrective results are acceptable (Barends et al., 2012).

## Risk Analysis using Risk Failure

In the failure mode and effects analysis, as many components and assemblies as possible are examined to identify the types of potential failures in the system and their causes and consequences. Each component's failure mode and the resulting impact on the rest of the system is recorded in a specific FMECA sheet. There are many variations of worksheets. FMEA can be a qualitative analysis but can be placed quantitatively when mathematical models are linked to failure rate statistical databases. It is one of the most structured and systematic error analysis techniques. It was developed by an experienced engineer in the late 1950s to study the problems that could arise from a faulty military system. FMEA is often the first step in system testing.

Project implementation can fail for several reasons. So, when a project with lots of hardware, data sources, and workforce fails, there are multiple failure modes. To identify multiple failure modes, you can categorize failure modes. It can be a system or an implementation, both technical and non-technical, but in this article, it will be easier to use the category system (Moubray, 2001)

Many mandatory books attract matched power to carry out the analysis and evaluation of risk assessment assessments, which can be carried out through 3 stages:

- Severity: To assess the magnitude of the impact of a problem on a project
- Occurrence: It is good to know how often an error occurs.
- Detection: Assessing the controllability of a product or process to detect problems when they occur

### **Microsoft Power BI**

Microsoft Power BI is a business data analysis platform developed by Microsoft. Power BI enables users to collect data from multiple sources, aggregate it, and produce interactive and informative visualizations. Power BI can connect to various data sources, including spreadsheets, databases, cloud services, and business applications such as Salesforce or Google Analytics. Power BI Dashboard collects data from various sources and displays it in an easy-to-understand visualization. This dashboard lets users view real-time business information and decide based on the presented data.(Knight et al., 2018)

Power BI Dashboard has various features that make it easier for users to analyze data. One of its most useful features is combining data from multiple sources, including Excel, SQL Server, and other applications. The Power BI Dashboard also offers various visualizations, such as graphs, charts, and tables, so that users can choose the most suitable visualization for their data. Power BI Dashboard also allows users to create reports to share with their team or clients. This report can be viewed online or downloaded in various formats, such as PDF or Excel.

Power BI Dashboard users can also access a natural language processing tool called Q&A. This tool allows users to ask questions in natural language about their data and get the right answers. In today's competitive business world, decisions based on accurate and up-to-date data are the key to success. Power BI Dashboard helps users gain better business insights and make better decisions. With its powerful and easy-to-use features, Power BI Dashboard is invaluable for any business looking to optimize their data usage.

Following are some of the advantages and benefits of Microsoft Power BI which include the following:

**Strong integration:** Power BI enables seamless integration with various data sources, including Excel, SQL databases, cloud services like Azure, and more. It makes it easy for users to combine and combine data from multiple sources to get more comprehensive insights. **Powerful data visualizations:** Power BI offers various powerful data visualizations, including graphs, charts, maps, and more. It allows users to represent data in an easy-to-understand and attractive visual, enabling better analysis and more effective decision-making. **Interactive dashboards:** Power BI allows users to create interactive dashboards that display multiple data visualizations simultaneously. Users can explore and analyze data quickly through direct interaction with dashboard elements. This feature enables real-time monitoring, a better understanding of trends and patterns, and rapid detection of anomalies or problems that require immediate action.

**Collaboration and sharing:** Power BI enables users to easily share reports, dashboards, and datasets with team members or other stakeholders. Users can set access permissions, post sharing links, or embed reports in other websites or apps. It enables efficient collaboration and consistent data updates across the organization.

**Advanced data analysis:** Power BI provides a variety of powerful data analysis capabilities, including features such as data modeling, data cleansing, predictive analysis, and intelligent visualization. It allows users to dig deeper into data, identify trends, make forecasts, and answer complex business questions.

**Scalability and availability:** Power BI is a reliable and scalable cloud-based platform. It enables organizations to manage large volumes of data with fast performance and high reliability. In addition, Power BI can also be accessed through various devices, including desktop, web, and mobile devices, providing broad access flexibility.

Microsoft Power BI enables organizations to turn complex data into high-value insights with better analysis, smarter decision-making, and efficient collaboration

### **3. METHODS**

Data collection in this study was carried out through group discussion forums. This method was chosen because it allows respondents to share information and their views directly. The respondents in the discussion group forums came from various backgrounds and had various knowledge about the research topic. Discussions conducted in this forum allow interaction and exchange of ideas between respondents, which can produce rich and varied data. Researchers also ensure that the confidentiality and privacy of respondents are maintained by using this method. Respondents in this study consisted of several parties involved in the company.

Problem identification in this study will be devoted to knowing and determining the risks that may occur in integrated digital reporting projects by taking both primary and secondary data obtained from service providers, consultants, and service users who carry

## Risk Analysis using Risk Failure

out the project by carrying out Focus Group Discussions (FGD) as well as conducting questionnaires to related parties.

**TABLE 1.** Respondents' forum study group

Projects	Developer
PMO Manager Business Operational Manager Acceptance Manager CR Controller WCC Controller POR Coordinator Recon Coordinator SO Controller	Tools Manager NDPD Key user

From these data, severity, occurrence, and detection will be identified through the Risk Failure Mode and Effect Analysis (RFMEA) method. From these results, it will be possible to determine the value of the Risk Priority Number (RPN) from the multiplication of severity, occurrence, and detection. With the Risk Priority Number (RPN) value, the next steps can be determined as a risk response needed to reduce the effect of risk events on implementing integrated digital reporting projects, which will likely become obstacles to implementation in the field.

In implementing this project, the possible risks can be divided into two things that can cause work delays: technically and administratively. Technically, delays can be caused by unexpected data, unpreparedness problems and inappropriate methods. Administrative problems here can be the long updating process for each work task.

The identified risks were generated using the forum group discussion (FGD) method with various experts and parties involved in this project. The resource persons who participated in this discussion were the personnel directly responsible for the implementation and decision-making of this project. After several considerations and discussions, it was found that several risks occurred in the implementation.

The values of severity, occurrence, and detection that will be used can be seen in the following table:

**TABLE 2.** Severity value

Scale	Impact
7	Time: Causing delays > 20% of the initial schedule
	Fees: Total costs increase > 30% of the initial value
	Technique: There is a significant design change so that the old design cannot be used and a new design is created
6	Time: Causing a delay of > 15% from the initial schedule
	Fees: Total costs increase > 25% of the initial value
	Technique: There is a significant design change so that the old design cannot be used and a new design is created
5	Time: Causing a delay of > 10% from the initial schedule
	Cost: Total cost increases > 20% from the initial value

Scale	Impact
	Technique: There is a significant design change so that the old design cannot be used and a new design is created
4	Time: Causing a delay of 8% > to <10 % of the original schedule
	Fees: Total costs increase by 10 % > up to < 15% of the initial value
	Technique: There is a large-scale design change giving rise to a new design
3	Time: Causing a delay of 5% > up to < 8% of the initial schedule
	Fees: Total costs increase by 5% > up to < 10% of the initial value
	Technique: There is a moderate design change giving rise to a new design
2	Time: Causing <5 % delay from the original schedule
	Fees: Total costs increase < 5% of the initial value
	Technique: There is a small design change that gives rise to a new design
1	Time: Not Significant
	Fees: small fee increases
	Technique : No change

TABLE 3. Occurrence value

Scale	Impact
1	Always happen
2	Often
3	Sometimes
4	Happened several times
5	Not often
6	Rare
7	Almost never

TABLE 4. Detection value

Scale	Impact
1	Certain
2	Easy
3	Pretty Easy
4	Currently
5	Difficult
6	Very difficult
7	Impossible to detect

After the severity, occurrence, and detection values are known, the RPN value is determined by the following equation:

$$RPN = \text{severity (S)} \times \text{occurrence (O)} \times \text{detection (D)} \tag{1}$$

## Risk Analysis using Risk Failure

If the RPN value exceeds the value based on the Pareto diagram number scale, then mitigation must be carried out to control risk.

After obtaining the RPN value, the next step can be processed into a Pareto diagram to sort the levels of the RPN. Risk analysis uses Pareto to identify the key risks that impact the project most. Pareto analysis displays risk codes sequentially, from the highest to the lowest RPN value. A critical threat can be determined based on the recorded threats and known RPN values. A risk is classified as critical if its RPN exceeds a critical value. The average RPN value for all risks determines the RPN critical value.

$$\text{RPN critical value} = \text{Total RPN} / \text{Total risk} \quad (2)$$

Refer to the critical value above; the RPN value is obtained above the critical risk. So that these risks get special attention

## 4. RESULTS

The identified risks were generated using the forum group discussion (FGD) method with various experts and parties involved in this project. The resource persons who participated in this discussion were the personnel directly responsible for the implementation and decision-making of this project. After several considerations and discussions, it was found that several risks occurred in the implementation. Various risks in implementing this project are arranged in a Risk Breakdown Structure (RBS) as shown in Table 5 below.

**TABLE 5.** Risk Breakdown Structure

No	Risk Item	Risk Potential
1	Technical Risk	Limitations of Power BI Functionality
2		Integration Failure with Existing Systems
3		Inadequate Performance and Capacity
4		Vulnerable Data Security
5		Limitations in Integration with Complex Legacy Systems
6		Incompatibility Between Power BI Versions and Supporting Components Used
7		Not Compatible with the Operating System or Device Used by the User
8		System Failure or Network Limitation Interfering with Access to the Dashboard
9		Lack of Availability or Compatibility of Required Data Sources
10		Vulnerability to Attacks and Unforeseen Security Threats
11		Configuration or Maintenance Errors that Interfere with Dashboard Performance
12		Technology and Standard Changes Impacting Dashboard Functionality
13	Quality Risk	Data Inaccuracies in Reporting
14		Information Inaccuracy and Misalignment
15		Limitations in Data Visualization
16		Reliance on Unstable External Data Sources

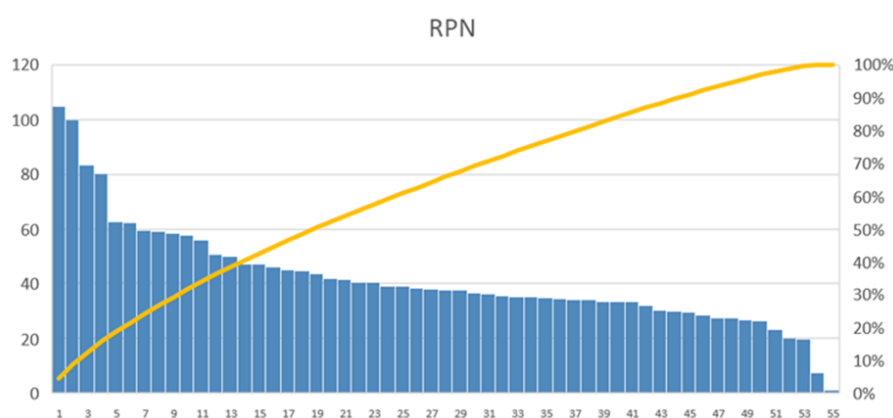


No	Risk Item	Risk Potential
17		Inconsistency of Data Formats and Standards
18		Lack of Data Validation and Verification
19		Errors in Data Transformation and Processing
20		A mismatch between User Requirements and Dashboard Functionality
21	Project Risk	Inadequate Project Planning
22		Lack of Available Resources
23		Frequent Changes in Needs
24		Schedule Conflicts That Allow Delays
25	Financial Risk	Implementation Costs that Exceed Budget
26		No Significant Return on Investment
27		Expensive Device and Licensing Dependence
28		Inability to Cope with Changes in Costs
29	Usage Risks	Low Acceptance Rate from Users
30		User Ignorance in Using Power BI
31		Limited Training and User Support
32		Resistance to Changes in the Reporting Process
33		User's Inability to Use Power BI Advanced Features
34		Data Input Error by User
35		Lack of User Training and Education on Using the Dashboard
36		Lack of Support and Help System for Users
37		Lack of Consistent Use of the Dashboard by Users
38		Reliance on Certain Users Who Are Proficient in Operating the Dashboard
39		Resistance from Users in Adopting Changes to the Reporting Process
40	Security Risk	Violation of User Data and Information Security
41		Identity Theft and Abuse of Access
42		Significant Data Loss or Damage
43		Attacks and Malware Threatening the System
44		Vulnerable to Phishing and Social Engineering Attacks
45		Lack of Adequate Data Encryption and Protection
46		No Effective Security Audit and Monitoring Mechanisms
47		User Ignorance in Securing Access and Data
48	Third Party Risk	Delays or Failures from Power BI Vendors
49		Limitations in Technical Support from Vendors
50		Conflict of Interest with Vendors or Partners
51		Dependence on Vulnerable External Resources
52	Organizational Risk	Organizational Strategy Changes Affecting Projects
53		Inconsistencies in Data and Information Policies
54		Lack of Management Commitment and Support
55		Research Needs and Changes in Organizational Infrastructure

## Risk Analysis using Risk Failure

From several risk identifications above, all types of events are tabulated and combined with their risk weights to determine the RFMEA method, the rating value of the probability of occurrence of risk (Occurrence), impact due to risk (Severity) and detection of risk (Detection) can be determined. Determination of the three ratings will determine the critical risk of the work package, which has its standards for rating severity and occurrence and these standards are used in this study. The FGD research took quite a long time because the FGD procedure involved experts in discussion. The experts who discussed often compared comments for each of the opinions expressed. Determination of ratings has been carried out in focus group discussions (FGD) discussions, and several ratings have been agreed upon.

We process the results of the RPN values to make them in a Pareto chart based on the ranking order of the RPN. This Pareto analysis is used to identify the key risks that have the greatest impact on this digital reporting project.



**FIGURE 1.** RPN Pareto

The next process is to add up the RPN values; in this calculation, the RPN value is 2300 points. Critical risks can be identified by considering recorded risks and known RPN values. Risk is classified as critical if its RPN value exceeds a critical threshold. The RPN critical threshold is determined based on the average RPN value of all existing risks, which can be calculated using the formula:

$$\text{Critical value: Total RPN/Amount of risk} = 2300/55 = 42 \quad (1)$$

From the results of the critical level calculation above, many risks that have the potential to arise come from usage, project, and project risks. The risk with the highest RPN value is the potential risk of user data input errors and resistance to changes in the reporting process. It is very risky, considering the information provided will be a benchmark for a project reported as a result consumed by various parties.

## 5. CONCLUSIONS

Based on the impact analysis and countermeasures that have been described previously, we can conclude the following matters relating to the stated research objectives:

1. Identify risks that affect project implementation: The risk analysis that has been carried out has identified various risks that may arise in the implementation of digital reporting integration with the Power BI dashboard. These risks include incorrect data input by
2. Assessing the amount of risk by analyzing risk, severity, detection, and occurrence: In risk analysis, an assessment of the amount of risk is carried out by considering factors such as severity, likelihood of occurrence, and possibility of detection. Using this approach, we can describe the level of risk faced by each identified risk. It helps in prioritizing risks to be addressed and allocating resources appropriately.
3. Formulate recommendations for response and risk mitigation: Based on the risk analysis, countermeasures have been formulated to overcome and reduce the impact of risks that may occur. For example, recommendations include implementing data validation, user training, and regular data checks to reduce the risk of incorrect data input by users.
4. Recommendations to address the risk of resistance to change include effective communication, user engagement, and role modeling for management. By formulating these recommendations, we can prepare effective mitigation strategies and reduce the negative impact of the identified risks.

Thus, the impact analysis and the countermeasures carried out significantly contribute to the stated research objectives, namely identifying risks, assessing the magnitude of the risks, and formulating recommendations for countermeasures. It helps understand and manage risks in implementing digital reporting integration with the Power BI dashboard more effectively and efficiently.

The managerial implications that can be obtained are in increasing speed and efficiency. Using Power BI allows managers to access and analyze data in real-time. It enables faster and more informed decision-making based on the latest information. Managers can save time and effort in collecting and processing manual data so that they can focus on more valuable analysis and action.

## REFERENCES

- Barends, D. M., Oldenhof, M. T., Vredenburg, M. J., & Nauta, M. J. (2012). Risk Analysis of Analytical Validations by Probabilistic Modification of FMEA. *Journal of Pharmaceutical and Biomedical Analysis*, 64–65.  
<https://doi.org/10.1016/j.jpba.2012.02.009>
- Knight, D., Pearson, M., Knight, B., Quintana, M., & Powell, B. (2018). *Microsoft Power BI Complete Reference: Bring your data to life with the powerful features of Microsoft Power BI*. Packt Publishing.
- Moubray, J. (2001). *Reliability-Centered Maintenance*. Industrial Press Inc.
- Parviainen, P., Tihinen, M., Kääriäinen, J., & Teppola, S. (2017). Tackling The Digitalization Challenge: How to Benefit from Digitalization in Practice.

- International Journal of Information Systems and Project Management*, 5(1).  
<https://doi.org/10.12821/ijispm050104>
- Project Management Institute. (2017). Project Management Body of Knowledge (PMBOK®) 6th Edition. In *Project Management Institute* (Vol. 40, Issue 2).
- Raftery, J. (2003). Risk Analysis in Project Management. In *Risk Analysis in Project Management*. <https://doi.org/10.4324/9780203474556>
- Stamatis, D. H. (2003). *Failure Mode and Effect Analysis: FMEA from Theory to Execution* (2nd ed.). ASQ Quality Press.
- Stamatis, D. H. (2019). Risk Management Using Failure Mode and Effect Analysis (FMEA). In *American Society for Quality, Quality Press, Milwaukee* (Vol. 191, Issue December).
- Vaughan, E. J., & Vaughan, T. M. (2013). *Fundamentals of Risk and Insurance* (11th ed.). John Wiley & Sons.
- Vial, G. (2019). Understanding Digital Transformation: a Review and a Research Agenda. In *Journal of Strategic Information Systems* (Vol. 28, Issue 2, pp. 118–144). Elsevier B.V. <https://doi.org/10.1016/j.jsis.2019.01.003>

**How to cite this article:**

Taufik, T.A., Dytha, B. W. (2022). Risk Analysis Using Risk Failure Mode and Effect In Implementation of Integrated Digital Reporting with Power BI Dashboard. *Jurnal Teknobisnis*, 8(2): 32 - 43. DOI: 10.12962/j24609463.v8i2.1404